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The Adipic Acid Enhanced Flue Gas Desulfurization Process for Industrial Boilers. Volume 1. Field Test Results

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Desulfurization	Field Tests		07A,07D	14B
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Sulfur Oxides			07B	
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This document has been reviewed in accordance with U.S. Environmental Protection Agency policy and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

ABSTRACT

The purpose of this study was to evaluate the effect of the addition of adipic acid on the SO_2 removal of a wet limestone flue gas desulfurization (FGD) system on a coal-fired industrial boiler facility. The boiler facility at the Rickenbacker Air National Guard Base near Columbus, Ohio, was selected for this study. Emission data were collected in accordance with the promulgated regulations for SO_2 compliance data as specified in the Federal Register. The test results show that the addition of adipic acid to the limestone slurry significantly improved the SO_2 removal efficiency of the FGD system. Limited baseline data on operations with limestone only indicated a performance level of 55 percent SO_2 removal. With the addition of about 2200 ppm of adipic acid to the limestone scrubbing systems, the unit's level of performance increased to an average of 94.3 percent SO_2 removal which was maintained within a standard deviation of 2.2 percent over a 30-day test period during which boiler load ranged from 70 to 130 M Btu/hr and the gas throughput varied 300 percent.

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METRIC CONVERSION FACTORS

To convert English units	Multiply by	To obtain SI units
British thermal unit (Btu)	1054	Joule (j)
Cubic foot (ft^3)	0.0283	Cubic meter (m^3)
Degrees fahrenheit	5/9 (°F-32)	Degrees Celsius (C)
Foot	0.3048	Meter (m)
Gallon (U.S. Liquid)	0.0038	Cubic meter (m^3)
Gallon (U.S. Liquid)	3.7854	Liter (1)
Grain (gr)	0.06479	Gram (g)
Horsepower (hp)	746.0	Watt (w)
Inch	0.0254	Meter (m)
Inch	2.54	Centimeter (cm)
Inches of water	248.8	Pascal (pa)
Pound	0.4536	Kilogram (kg)
Ton, short	0.9072	Metric ton (kkg)

SECTION 1

INTRODUCTION

Testing by the Environmental Protection Agency (EPA) at their pilot plant at the Industrial Environmental Research Laboratory in Research Triangle Park (IERL/RTP) and at the Tennessee Valley Authority (TVA) Shawnee test facility indicated that the addition of relatively small quantities of adipic acid increases the ability of limestone scrubbing systems to remove sulfur dioxide (SO_2) from the flue gas of boilers. This improvement occurs in both conventional and forced-oxidation modes of operation. These tests also showed other advantages to be gained by the addition of adipic acid to the slurry: an increase in limestone utilization (hence, a decrease in waste solids disposal requirements), lower capital and operating costs, and elimination of the adverse effect of chloride (a problem in the limestone/MgO process).

The encouraging findings of these earlier tests prompted the EPA to contract Radian Corporation to conduct a full-scale demonstration of the use of adipic acid as an additive on a utility boiler flue gas desulfurization (FGD) system at the Southwest Power Station of the Springfield City Utilities. The agency also contracted PEDCo Environmental, Inc., to conduct an SO_2 monitoring program at a coal-fired industrial boiler facility equipped with a wet limestone FGD system.

The Rickenbacker Air National Guard Base (RANGB) near Columbus, Ohio, was selected as the site for the industrial boiler test. This report presents the results of this test.

SECTION 2

TEST SITE

The test to determine the effectiveness of the addition of adipic acid to the scrubbing slurry of a limestone FGD system on an industrial boiler took place at the Rickenbacker Air National Guard Base near Columbus, Ohio. It involved the use of a continuous SO_2 monitoring program designed to determine the effects of this additive on SO_2 removal efficiency. The goal of the test was to achieve a minimum of 90 percent SO_2 removal and to aim at 95 percent efficiency.

DESCRIPTION OF BOILER AND SCRUBBER

The six spreader stoker boilers at Rickenbacker Air National Guard Base have a total capacity of 210×10^6 Btu/h, and their primary purpose is to produce hot water for space heating. Sulfur dioxide emissions are controlled by a scrubber system manufactured by Research-Cottrell (R-C) under license from A. B. Bahco of Sweden. As shown in Figure 2-1, the pollution control system consists of a mechanical (cyclone) collector for particulate control, a Bahco SO_2 scrubber tower, a limestone storage and handling system, a clarifier (thickener), a booster fan, a sludge disposal pond, and associated ductwork, pumps, and controls. Table 2-1 presents key design parameters of the scrubbing system. During this test, a mechanical dry feeder introduced the adipic acid into the scrubber system at the same location where fresh limestone is added.

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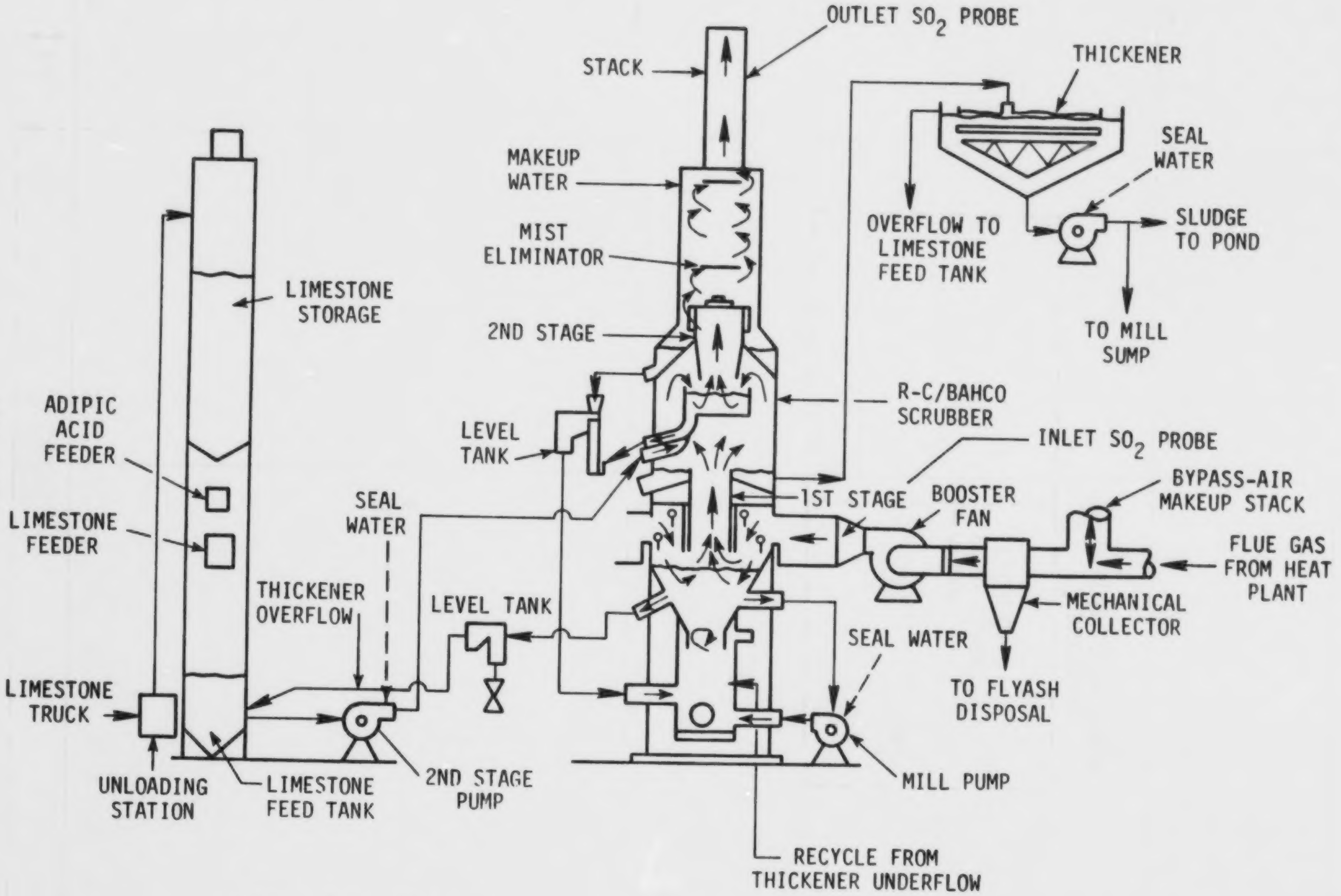
OUTLET SO_2 PROBE
STACK
THICKENER
MAKEUP WATER
SEAL WATER
MIST ELIMINATOR
OVERFLOW TO LIMESTONE FEED TANK
SLUDGE TO POND
LIMESTONE STORAGE
2ND STAGE
TO MILL SUMP
ADIPIC ACID FEEDER
LEVEL TANK
R-C/BAHCO SCRUBBER
INLET SO_2 PROBE
LIMESTONE FEEDER
SEAL WATER
1ST STAGE
BOOSTER FAN
BYPASS-AIR MAKEUP STACK
FLUE GAS FROM HEAT PLANT
THICKENER OVERFLOW
LEVEL TANK
MECHANICAL COLLECTOR
SEAL WATER
LIMESTONE TRUCK
TO FLYASH DISPOSAL
UNLOADING STATION
LIMESTONE FEED TANK
2ND STAGE PUMP
MILL PUMP
RECYCLE FROM THICKENER UNDERFLOW

Figure 2-1. Flow diagram of the scrubber system at Rickenbacker.

TABLE 2-1. DESIGN PROCESS INFORMATION FOR RICKENBACKER AIR NATIONAL GUARD BASE SCRUBBING SYSTEM

Scrubber gas flow	55,000 scfm
Number of boilers	6 spreader stoker units
Boiler capacity	210 x 10^6 Btu/h
Number of separate FGD units	1
Control system vendor	Research-Cottrell/Bahco
Type of FGD system	Retrofit
Startup date	March 1976
SO_2 removal efficiencies	90%+ design with lime operation; 55-77% with limestone operation
Particulate removal efficiency	98% design
Water makeup	Open loop
Sludge or byproduct disposal	Unstabilized $CaSO_3/SO_4$ sludge to lined pond

The untreated flue gas from the individual boilers, which enters a common header equipped with a bypass stack, is fed through a mechanical collector for primary removal of particulates. The design removal efficiency of the mechanical collector is 70 percent. A fan then introduces the partially cleaned flue gas into the scrubbing tower for SO_2 and particulate removal. At lower boiler loads when the flue gas flow drops to less than about 50,000 scfm, outside air is drawn in through the bypass stack by adjusting the louver dampers. Thus, at lower boiler loads, the SO_2 concentration decreases and oxygen levels are high because of this dilution air.

The Bahco scrubber is a vertical tower consisting of two inverted venturi scrubbing stages. In this scrubber, the untreated gas enters the first stage, and is diverted downward to impinge on the liquid slurry surface. The gas then reverses direction and rises through the first-stage venturi, where it intimately mixes with the slurry droplets now entrained in it. The partially scrubbed gas is then diverted downward onto the liquid slurry surface in the second stage, and the process is repeated. The treated gas then travels upward into a cyclonic mist eliminator, where entrained slurry droplets are removed before the gas exits through a stack to the atmosphere.

Limestone is mixed with the thickener overflow liquor in the limestone feed tank to form fresh slurry. This slurry is then pumped to the second stage liquid reservoir. Some of this liquid is entrained in the gas and subsequently is caught in the second-stage carryover tray. The desired liquor level on the second stage is maintained by an external level tank. Originally, the weirs in the external tanks were adjustable, permitting the pressure drop across the scrubber to be varied. Because the weirs could not be adjusted during this test due to rust and corrosion, they were left at their original height. Liquor from both the second stage carryover and level tray is gravity fed to the first stage. This first-stage liquor is continually recirculated by the mill pump. Excess liquid from the first stage and the first-stage carryover tray is gravity fed back to the limestone feed tank, completing the circuit. A bleed stream from the first-stage carryover tray is sent to the thickener.

As mentioned before, thickener overflow liquid is returned to the limestone feed tank. The thickener underflow is intermittently pumped to the sludge pond. A density meter on the mill pump line controls the disposition of the thickener underflow. When the thickener underflow is not being sent to the sludge pond, it is fed back into the scrubbing loop at the bottom of the absorber. When the density (percent solids) reaches the high setpoint, the solids are sent to the pond. At the low set point, the system goes back on recycle. Usually, the system purged solids approximately 25 percent of the time. Cycling time was about two hours.

Makeup water was added at several points: (1) pump seal water; (2) water for lime slaking or limestone slurrying; and (3) flush water for scrubber internals including mist eliminator wash (mist eliminator is washed while thickener underflow is being pumped to the pond). No water is returned from the pond to the system; therefore, this is an open-loop process, from a water balance standpoint.

After some maintenance work and calibration, the plant's DuPont continuous SO_2 monitoring system was used to monitor SO_2 concentrations. Research Triangle Institute, under contract to EPA, audited the monitoring system on March 5 and 6, 1981, and found it to be operating properly. Both the certification (based on Federal Register Procedures) and internal audits (based on certified SO_2 and O_2 gases) showed that the monitors were operating properly. Some problems entailing unscheduled maintenance were encountered during the initial 168-hour monitor conditioning period. Also on March 20, a small leak was discovered in the SO_2 monitor internal valving system. Apparently, rich inlet gas that had leaked through this valve into the outlet gas sample stream caused a slightly higher outlet SO_2 concentration reading and a corresponding lower calculated SO_2 removal efficiency. The extent of the leak was determined by introducing audit gases and making manual SO_2 tests of the flue gases, and a correction factor was applied to the outlet readings from March 18 until the leak was repaired on April 3.

SECTION 3

RESULTS

EMISSION DATA

Table 3-1 presents a summary of the daily average SO_2 monitoring data covering 30 days on which 18 hours or more of acceptable SO_2 and oxygen readings were obtained and high efficiency was achieved. These data show that a 94.3 percent mean SO_2 removal efficiency was achieved, with a corresponding standard deviation of 2.1. These data do not reflect results on days when the limestone feed rate was low or other known operating problems occurred. The emission values are based on a factor of 9780 dscf/10^6 Btu[1] at no excess air, and were corrected for the actual oxygen content. The average inlet SO_2 loading for the test period was 4.94 lb/10^6 Btu of heat input to the boiler, whereas the average SO_2 outlet loading was 0.28 lb/10^6 Btu. Limited data obtained by manual testing methods from February 12 to 16, 1981 (prior to the addition of adipic acid) showed an SO_2 removal efficiency ranging from 45 to 65 percent. Previous tests showed an average SO_2 removal efficiency of about 66 percent with limestone[2] and 91.5 percent with lime.[3] Figure 3-1 presents the daily SO_2 efficiency data for the 30-day monitoring period and for the initial monitor conditioning period. Although these earlier SO_2 data are not certified,* a dramatic increase in SO_2 removal efficiency is evident starting on February 17, when the adipic acid feed was started and limestone feed was increased.

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* Most of the SO_2 data prior to March 4 represent only a portion of a day.

TABLE 3-1. 30-DAY SUMMARY OF SO_2 CONCENTRATIONS AND SCRUBBER EFFICIENCY MARCH-APRIL, 1981

DATE	# HOURS CEM DATA	SO2 INLET LB/MMBTU	SO2 INLET NG/J	SO2 OUTLET LB/MMBTU	SO2 OUTLET NG/J	EFF %
MARCH 4	24	4.00	1719.8	0.30	129.0	92.5
MARCH 5	18	3 10	1332.9	0.14	60.2	95.5
MARCH 6	21	4.11	1767.1	0.24	103.2	94.2
MARCH 7	23	3.82	1642.4	0.30	129.0	92.1
MARCH 8	19	4.16	1788.6	0.37	159.1	91.1
MARCH 9	20	4.17	1792.9	0.27	116.1	93.5
MARCH 10	20	4.88	2098.2	0.27	116.1	94.5
MARCH 11	19	4.37	1878.9	0.21	90.3	95.2
MARCH 12	18	4.45	1913.3	0.22	94.6	95.1
MARCH 14	18	6.19	2661.4	0.45	193.5	92.7
MARCH 15	22	5.21	2240.1	0.30	129.0	94.2
MARCH 20	21	4.95	2128.3	0.32	137.6	93.5
MARCH 21	19	5.22	2244.4	0.15	64.5	97.1
MARCH 22	23	4.64	1995.0	0.25	107.5	94.6
MARCH 24	22	5.48	2356.1	0.55	236.5	90.0
MARCH 25	18	4.97	2136.9	0.32	137.6	93.6
MARCH 26	21	6.15	2644.2	0.32	137.6	94.8
MARCH 27	21	4.85	2085.3	0.29	124.7	94.0
MARCH 28	23	4.52	1943.4	0.43	184.9	90.5
MARCH 29	19	6.43	2764.6	0.61	262.3	90.5
MARCH 30	18	5.38	2313 1	0.36	154.8	93.3
APRIL 2	24	4.83	2076.7	0.14	60.2	97.1
APRIL 3	21	5.07	2179.9	0.13	55.9	97.4
APRIL 4	22	4.79	2059.5	0.18	77.4	96.2
APRIL 5	22	5.27	2265.9	0.33	141.9	93.7
APRIL 6	22	5.15	2214.3	0.19	81.7	96.3
APRIL 7	22	5.40	2321.7	0.17	73.1	96.9
APRIL 8	23	5.50	2364.7	0.21	90.3	96.2
APRIL 9	22	6.16	2648.5	0.34	146.2	94.5
APRIL 10	23	5.06	2175.6	0.16	68.8	96.8
MEAN		4.94	2125.1	0.28	122.1	94.3
MAXIMUM		6 43	2764.6	0.61	262.3	97.4
MINIMUM		3.10	1332.9	0.13	55.9	90.0
STD DEV		0.75	323.1	0.12	50.4	2.1
% STD DEV		15.2	15.2	41.3	41.3	2.2

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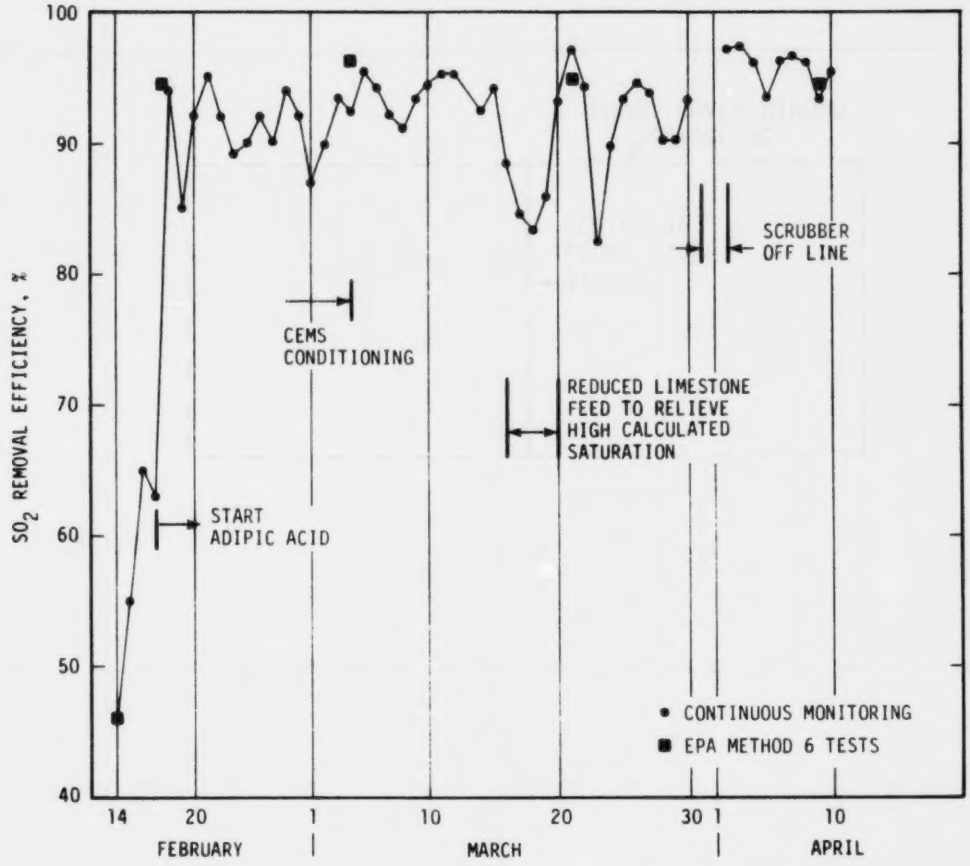

Figure 3-1. Average daily SO_2 removal efficiencies.

Appendix A contains hourly SO_2 data and 10-minute-average data on SO_2 and oxygen concentration at the scrubber inlet and outlet sites. It also contains additional data not presented in the 30-day summary because of reduced SO_2 removal efficiency. Appendix B summarizes the audit and quality assurance tests that were conducted during the monitoring program to ensure accurate data. Appendix C summarizes scrubber and monitor availability information. These data show that the scrubber was available about 95 percent of the time during the test period (it was shut down for 48 out of 912 hours). Monitor availability was maintained at an overall high level of 85 percent.

FLUE GAS DATA

Table 3-2 presents data on inlet flue gas conditions and the pressure drop across the mist eliminator. These data, which were measured by the plant's instruments, indicate wide variations in both the inlet gas volume and the temperature. Depending on the boiler load, the flue gas volume ranged from as low as 25,000 scfm to more than 70,000 scfm (the maximum gauge reading). Temperature fluctuated from a low of 210°F to a high of 495°F. This variation in the temperature generally followed the pattern of high gas temperature at high boiler load. Temperature variation is important because it affects the system's water balance. More water is required for quenching during periods of higher temperature and high inlet flue gas loading than during periods of low gas loading.

Table 3-3 shows the results of manual gas flow measurements performed to check the plant's annubar gas flow meter and other instruments. The March 20 reading taken at the scrubber inlet was in close agreement with the instrument value shown in Table 3-2. The difference between hot gas coming

TABLE 3-2. DATA ON BOILER LOAD, INLET FLUE GAS CONDITIONS, AND PRESSURE DROP ACROSS THE MIST ELIMINATOR (plant data)

Date 1981	Boiler load, 10^6 Btu/hr	Coal rate, tons/day	Inlet flue gas			Pressure drop across mist eliminator, in. H_2O
			Flow, 1000 scfm	Temperature, °F	Pressure, in. Hg	
Feb. 18	112		50	340		
19	108		29-38	270-340	29-30	
20	85-109	77.1	38-49	340-370	28-29	1.7
21	94	81.9	37	400	29	1.8
22	97	84.0	47	360	29.5	1.8
23	117	101.6	57-60	370-465	28-29	1.7
24	113-118	114.8	70+	440-450	28.5	1.7
25	110	115.9	65+-70	420-440	29	1.7-1.8
26	105-118	102.8	70+	455-480	28-29	1.7-1.9
27	107-117	118.2	70+	460-495	29-30.5	1.7-1.8
28	105	102.9	65-66	410-430	30.5	1.6-1.7
Mar. 1	105-113	113.0	70+	420-436	31	1.7
2	108	98.5	70+	380-450	30-31	1.7-1.8
3	117	96.2	64-70+	360-390	31	1.7-1.9
4	99	91.4	70+	360-380	30-31	1.8
5	110-135	102.1	70+	350-410	30-31	1.6-1.7
6	119-125	119.7	70+	410-440	30.5	1.7
7	127	119.1	70+	460	31	1.7
8	126	125.2	66-68	430	31	1.7
9	114-123	111.6	64-70+	350-430	30-35.5	1.7-2.2
10	105-123	109.8	70+	420-450	30-31	1.8
11	101	90.6	68-70+	370-380	30	1.7
12	100	85.8	62-70+	330-390	30	1.7-1.8
13	92	88.4	59-69	310-360	30	1.7
14	98	92.6	45-70+	360-385	30-31	1.7
15	93	91.7	65	359	31	1.8
16	106	101.8	62-70+	370-480	29-30.5	1.7-2.0
17	108	120.8	65-70+	440-480	28-29	1.7-2.0
18	100	107.4	60-70+	440-460	29	1.4-1.9
19	121	123.7	70+	440-460	29	2.1-2.3
20	118	115.2	64-70+	380-460	29-31	1.9-2.5
21	103	102.6	60-69	360-450	29-31	2.5
22	98	89.9	57-62	400	29	2.9
23	89	93.6	53-58	360-380	29-30	2.1-2.9
24	98	89.6	37-50	335-385	29-30	2.1-3.0
25	95	89.3	49-62	320-330	30-33	2.5-3.2
26	93	85.4	49-62	260-340	30-33	2.2-2.7
27	95	88.8	49-62	320-370	30-33	1.8-2.1
28	89	86.2	52-60	320-370	30-31	1.6-1.7
29	79	71.1	48-55	260-280	29-30	1.6-1.7
30	75	62.9	61-67	240-260	30-32.5	1.7-2.0
31	80	72.4	Scrubber down			
Apr. 1	76	64.5	60	250	30	1.9
2	71	69.0	50-61	210-270	30-32	1.6-1.7
3	71	55.1	48-58	230-270	30	1.8-1.9
4	80	55.2	35-37	260	30	1.5
5	82	67.3	28	280	27.5	1.2
6	77	61.7	25-48	260-290	28-30	1.5-1.7
7	75	62.0	47-52	230-260	29-30.5	1.6-2.0
8	69	60.0	40-48	220-250	30-32	1.7-2.0
9	69	57.5	37-55	240-260	30.5	1.9-2.0
10	63-70	67.3	37-46	240-250	31	1.9

TABLE 3-3. FLUE GAS MEASUREMENTS

Point of measurement	Date (1981)	Time, 24h	Stack temp., °F	Stack pressure, in. Hg	Moisture,[a] %	Oxygen, %	Carbon dioxide, %	Flow rate,	
								acfm[b]	dscfm[c]
Outlet	2/12	1720	122	30.26	12.0	14.0	4.2	83,546	67,410
	2/13	1430	124	30.21	12.7	13.9	5.7	86,770	69,122
	2/14	1430	123	30.08	12.5	13.4	5.8	86,722	69,122
Inlet	3/20	1100	382	32.23	4.0	-	-	101,300	65,425

[a] Moisture tests were performed to confirm that the gas stream was saturated. Values presented are based on saturation except at inlet which is a measured value.

[b] Actual cubic feet per minute at stack conditions.

[c] Dry standard cubic feet per minute at 68°F and 29.92 in. Hg.

into the scrubber at 382°F and a rate of 101,300 acfm and saturated gas leaving the scrubber at 123°F and about 75,000 acfm is representative of most of the days the system was monitored. Although the Bacho scrubber was designed to operate over a range of 60,000 to 85,000 acfm at 380°F, when the heat demand necessitated four or five boilers (including Unit 8 at 60 x 10^6 Btu/h) to be on line, the incoming flue gas sometimes reached as high as 150,000 acfm at 450°F.

COAL COMPOSITION

Table 3-4 presents the analyses of the coal burned during the entire test period. These data show that the coal sulfur content during the continuous monitoring period from early March to April 10 ranged from 2.22 to 3.55 percent sulfur by weight on a dry basis. Based on these coal data, the calculated SO_2 emission rate (assuming 95 percent of the sulfur is converted into SO_2) ranged from 3.02 lb/10^6 Btu to 5.14 lb/10^6 Btu.

The actual maximum and minimum daily average SO_2 inlet measurements for the 30-day test period were 6.43 lb/10^6 Btu and 3.10 lb/10^6 Btu. The minimum measured value agrees well with the minimum calculated value, whereas the maximum measured value (6.43 lb/10^6 Btu) is about 25 percent higher than the calculated value (5.14 lb/10^6 Btu). This difference is attributed to the daily variability in the sulfur content of the coal that was monitored compared with the calculated maximum sulfur content, which was based on the analysis of a weekly composite coal sample.

SLURRY COMPOSITION

Table 3-5 presents the average daily limestone and adipic acid feed rates for the entire test period. Of particular interest is the ratio of

TABLE 3-4. COAL COMPOSITION[a]
(%, except as noted)

	Date (1981)												
	2/12	2/13	2/14	2/16	2/17	2/24	3/2-6[b]	3/9-13[b]	3/16-20[b]	3/23-27[b]	3/30-4/3[b]	4/6-10[b]	4/16
Sulfur	2.62	2.80	3.00	1.62	2.51	1.64	2.86	3.55	2.85	2.70	2.73	2.22	3.10
Carbon	73.06	73.67	69.37	76.23	74.71	74.29	71.48	72.19	74.98	72.61	74.13	75.50	74.14
Hydrogen	5.24	5.22	4.72	5.11	5.26	5.30	5.37	5.19	5.37	3.64	5.33	5.61	5.42
Oxygen	9.24	8.38	13.84	7.19	7.59	9.06	7.76	7.72	7.83	11.77	9.78	8.99	7.79
Nitrogen	1.58	1.56	1.51	1.81	1.64	1.74	1.54	1.56	1.65	1.54	1.49	1.67	1.65
Chlorine	0.19	0.21	0.20	0.20	0.18	0.14	0.18	0.12	0.16	0.09	0.09	0.12	0.07
Volatile matter	41.65	41.54	41.71	37.47	38.61	37.18	38.99	39.08	40.82	40.01	40.58	40.93	40.27
Fixed carbon	50.09	50.09	50.73	54.49	53.10	54.85	50.20	51.25	52.02	52.34	52.97	53.18	51.90
Ash	8.26	8.37	7.56	8.04	8.29	7.97	10.81	9.67	7.16	7.65	6.45	5.89	7.83
Heat value, Btu/lb	13,500	13,340	13,420	13,560	13,500	13,620	13,000	13,114	13,590	13,328	13,427	13,955	13,536
Moisture	3.66	3.57	3.81	3.70	2.34	2.02	8.62	7.92	9.35	6.99	6.35	4.26	5.17

[a] Dry basis except for moisture.

[b] Composite.

TABLE 3-5. ADIPIC ACID AND LIMESTONE USAGE
(average lb/h)

Date		Adipic acid feed[a]	Limestone feed[b]
February	20		674
	21		
	22		
	23		575
	24		619
	25		729
	26	8	702
	27	8	716
	28	4	686
March	1	4	707
	2	8	720
	3	6	752
	4	14[c]	798
	5	6	820
	6	10[c]	793
	7	12[c]	854
	8	8[c]	853
	9	10[c]	814
	10	8	765
	11	8	771
	12	8	778
	13	6	742
	14	9	728
	15	9	731
	16	10	686
	17	8	489
	18	16[c]	542
	19	10	704
	20	16[c]	890
	21	14[c]	861
	22	4[d]	700
	23	6	479
	24	8	520
	25	10	656
	26	8	627
	27	10	595
	28	10	576
	29	8	468
	30	5[b,e]	405[e]
	31	0[f]	0[f]
April	1	14[c]	644
	2	12	467
	3	8	435
	4	8	480
	5	4[d]	526
	6	10	608
	7	10	496
	8	6	455
	9	6	447
	10	5	467

[a] 24-hour basis.

[b] Based on hours of feed.

[c] Adipic acid was dumped in the thickener.

[d] Vibrator was turned off. Adipic acid feeder was plugged.

[e] Scrubber was bypassed at 19:40 because the thickener was plugged. Limestone and adipic acid feeds were turned off at that time.

[f] The scrubber was still off-line. It was restarted before 8:00 on April 1.

adipic acid to limestone used to maintain the high SO_2 removal efficiencies, which varied from 12 lb/ton to 60 lb/ton and averaged 24 lb/ton. A total of 11,000 lb of adipic acid was added during the test period and a total of 450 tons of limestone was used.

Figure 3-2, which illustrates graphically the operational data presented in Table 3-5 and the coal rate, shows the wide variance that occurred in the scrubbing system as a result of the fluctuating heat demand.

When evaluating the test data obtained at this site, one should consider the following characteristics of the Rickenbacker scrubber:

1. The liquid-to-gas (L/G) ratio of the Rickenbacker scrubber is relatively low: 40 gal/1000 ft^3 at full load.
2. The scrubber does not have a constantly stirred effluent hold tank with sufficient retention time to complete the chemical reactions.
3. The flue gas handling system allows a high rate of air inleakage into the FGD system, which results in oxygen levels of 14 to 15 percent in the entering flue gas.
4. The flue gas typically contains high levels of soot (unburned carbon) and fine fly ash that pass through the mechanical collectors.
5. Data and observations indicate that the scrubber module is underdesigned with respect to maximum flue gas volume at full boiler load.

Because of the cumulative effect of these characteristics, variations had to be made in process operating parameters before and during the 30-day continuous monitoring program. Determination of the optimum recirculation slurry pH in conjunction with the adipic acid concentration levels in the scrubbing liquor was important. Data from the EPA/TVA Shawnee Test facility indicate that at low pH (4.8/5.0), high oxidation conditions are needed to optimize system performance when adipic acid is added to the slurry. Because the Rickenbacker FGD system typically operates at relatively low pH levels

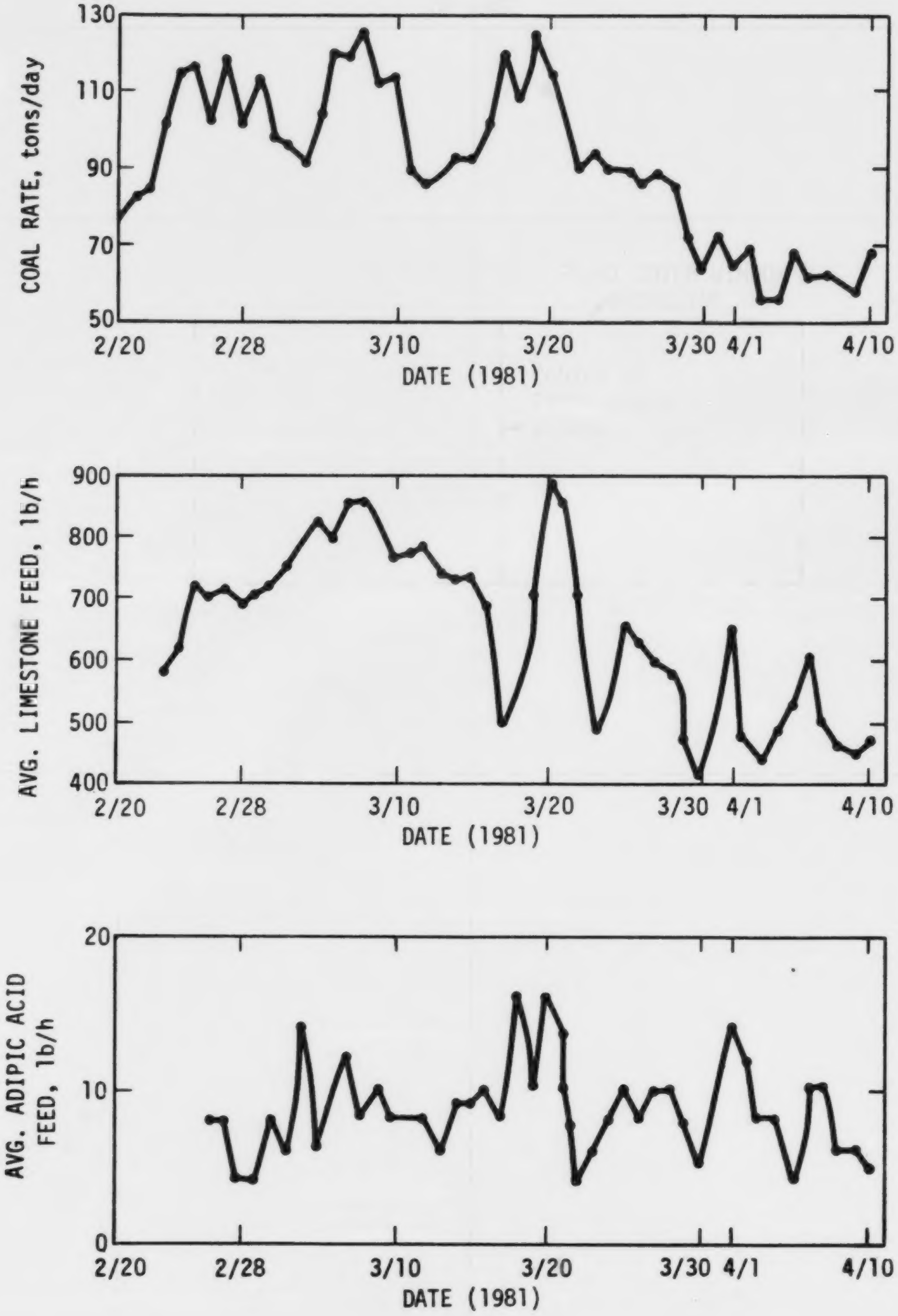

Figure 3-2. Adipic acid, limestone, and coal rate.

(4.0 to 5.0), when combined with the high level of "natural" oxidation encountered in the system due to the high oxygen content in the flue gas, the addition of adipic acid and subsequent higher SO_2 removal could have caused high consumption of adipic acid and possibly gypsum scale formation in the scrubber.

The pH and the adipic acid concentration were determined by drawing slurry samples and performing chemical analyses on site. These data were used to control the scrubbing slurry pH levels and the adipic acid addition rates to ensure high SO_2 removal.

Table 3-6 presents data on the clear liquor concentrations of calcium, sulfate, magnesium, and adipic acid in the slurry feed, and the pH of this stream. Measured sulfite (SO_3) concentrations were very low (<10 mg/liter) in the slurry feed stream. The chloride content of the slurry stream was high (generally >6000 mg/liter) until late March, when it decreased to the 2000 to 3000 mg/liter range. Appendix D contains more complete analytical results of the individual samples. During the early portion of the test program, calcium levels were in the 2000 to 2500 ppm range. These levels decreased when the limestone feed rate was reduced on March 16 because the calculated percentage of sulfate (gypsum) saturation indicated that scaling might occur (see later discussion). This caused a decrease in the pH of the slurry feed. On March 20 the feed rate was increased again, and calcium levels rose to the 1000 to 1300 mg/liter range. Magnesium levels were in the 1000 to 3000 mg/liter range during the remainder of the test period.

Uniform levels of calcium and adipic acid were difficult to maintain because of the lack of process control. Additionally, constant concentrations of calcium and adipic acid were difficult to maintain because of

TABLE 3-6. LIMESTONE SLURRY FEED CONCENTRATIONS AND pH

Date (1981)	Calcium, mg/liter	Sulfate,[a] mg/liter	Magnesium, mg/liter	Adipic acid concentration, mg/liter	pH
2/13	945	4,410	1,940	107	5.01
2/14	1,050	2,750	2,090	121	4.14
2/16	1,240	3,180	1,690	121	-
2/17	1,330	2,720	1,130	300	5.85
2/18	1,420	2,735	1,330	1,640	5.34
2/19	1,485	2,530	1,300	1,240	4.80
2/20	1,740	2,280	1,360	1,390	5.02
2/23	2,000	2,350	1,200	1,020	5.04
2/24	2,090	2,210	1,050	1,015	4.67
2/25	1,820	2,780	1,500	1,160	4.73
2/26	2,180	2,550	1,230	1,820	4.84
2/27	1,960	2,680	1,370	2,315	4.35
3/2	-	-	-	1,870	4.74
3/3	2,300	2,630	881	1,825	4.87
3/4	2,460	2,340	854	2,305	4.74
3/5	2,560	2,350	745	2,920	4.93
3/6	2,520	2,400	732	2,090	4.71
3/7	-	-	-	2,290	4.94
3/8	-	-	-	2,150	-
3/9	2,480	2,220	615	1,770	5.03
3/10	2,425	2,630	605	2,165	4.98
3/11	2,400	2,340	585	1,890	4.84
3/12	2,440	2,570	576	1,855	4.91
3/13	2,410	2,600	565	1,585	4.91
3/14	-	-	-	1,870	4.70
3/15	-	-	-	2,050	-
3/16	2,280	2,410	631	1,890	4.76
3/17	970	5,320	2,080	1,920	4.25
3/18	714	9,450	3,300	2,390	4.33
3/19	786	11,400	3,980	2,430	4.26
3/20	778	8,940	3,480	3,000	5.2
3/21	-	-	-	2,680	5.40
3/22	1,100	4,340	1,880	2,420	5.38
3/23	1,080	4,020	1,810	2,090	5.07
3/24	756	7,620	2,970	2,200	4.68
3/25	863	6,640	2,670	2,240	5.2
3/26	1,030	4,600	1,770	2,150	5.3
3/27	1,180	3,790	1,630	2,130	5.0
3/28	-	-	-	-	-
3/29	-	-	-	-	-
3/30	1,170	3,550	1,370	1,920	4.9
3/31	-	-	-	-	-

(continued)

TABLE 3-6 (continued)

Date (1981)	Calcium, mg/liter	Sulfate,[a] mg/liter	Magnesium, mg/liter	Adipic acid concentration, mg/liter	pH
4/1	1,060	3,090	802	830	5.8
4/2	1,310	2,610	912	1,950	5.5
4/3	1,320	2,690	742	2,040	4.8
4/4	1,260	2,730	939	2,160	4.7
4/5	-	-	-	2,200	4.6
4/6	1,230	3,470	1,220	2,170	5.2
4/7	1,510	2,880	1,050	2,820	5.1
4/8	1,340	3,320	1,330	2,850	5.05
4/9	1,130	3,730	1,890	2,510	4.6
4/10	1,180	3,740	1,960	2,400	4.7

- Indicates no data.

[a] Sulfite was always less than 10 mg/liter.

manual control, varying boiler load, and intermittent discharge of sludge to the holding pond.

Table 3-7 presents details of the purchase specification for the raw limestone used in the scrubber at Rickenbacker. Table 3-8 presents analyses of the weekly composite samples of raw limestone. These data show a fairly uniform limestone composition. Because analysis of the first weekly composite sample (dated 2/20) showed the presence of only insignificant amounts of potassium (K) or sodium (Na), tests to ascertain their content were not run on later limestone samples.

The solids portion of the limestone slurry feed stream, the thickener underflow stream, and the thickener inlet stream were also analyzed. These analyses were used as the basis for calculation of solids composition, limestone stoichiometric ratio, and limestone utilization.

Table 3-9 presents the chemical analysis of the weekly composites of the limestone feed slurry solids. Based on analytical results of thickener inlet solids, the magnesium fraction of the solids was assumed to be 1.43 weight percent.

Table 3-6 presents the chemical analysis of the thickener inlet stream. Calcium, magnesium, total sulfur as sulfate, acid insolubles, carbonate, calcium oxide, and fixed carbon were analyzed on a periodic basis.

Table 3-11 presents the chemical analysis for the weekly composites of the thickener underflow stream. Because the Rickenbacker scrubber is preceded only by cyclones to remove fly ash, the scrubber slurries were "soot" black in color. Analysis of the thickener inlet solids showed them to contain 2.34 weight percent unburned (fixed) carbon. Because the thickener

TABLE 3-7. LIMESTONE PURCHASE SPECIFICATIONS[a]

Chemical specifications	
Calcium carbonate	84 to 87%
Magnesium carbonate	11 to 14%
Iron, iron aluminate, silica, and traces of other metals	2% or less
Screening specifications	
Through 40-mesh screen	100%
Through 60-mesh screen	99.9%
Through 80-mesh screen	99.7 to 99.9%
Through 100-mesh screen	99.0 to 99.5%
Through 200-mesh screen	84.0 to 87.0%
Through 300-mesh screen	65.0 to 70.0%

[a] Delivered cost is approximately $25/ton.

TABLE 3-8. ANALYSES OF LIMESTONE SOLIDS
(weight percent)

	Weekly composites							
Constituent	2/20	2/27	3/6	3/13	3/20	3/27	4/3	4/10
Calcium	35.0	36.6	30.6	31.7	31.3	35.1	32.1	31.6
Magnesium	2.39	2.88	3.01	2.82	2.89	2.52	2.58	2.58
Potassium[a]	0.054	-	-	-	-	-		
Sodium[a]	0.025	-	-	-	-	-		
Acid insolubles	1.52	0.79	2.82	4.06	5.10	2.14	2.04	2.50

[a] Potassium and sodium verified as low; therefore not tested in later samples.

Note: Totals do not add up to 100% since oxygen, water of hydration, and trace constituents are not included.

TABLE 3-9. ANALYSES OF LIMESTONE FEED SLURRY SOLIDS (weight percent)

	Weekly composites				
Constituent	3/12	3/19	3/27	4/3	4/9
Calcium	23.4	19.9	20.2	16.0	15.9
Magnesium	1.43[a]	1.43[a]	1.43[a]	1.43[a]	1.43[a]
Total sulfate	38.4	44.0	42.9	41.1	43.5
Acid insolubles	4.65	6.59	3.35	2.30	2.94
Carbonate, as CO_2	8.95	5.53	11.20	5.62	11.80

[a] Assumed value (from thickener inlet analysis).

Note: Totals do not add up to 100% since water of hydration is not included and carbonate is actually present as CO_3.

TABLE 3-10. ANALYSES OF THICKENER INLET SLURRY SOLIDS
(weight percent)

Constituent	Daily values					Weekly composites					
	2/11	2/12	2/18	2/25	2/27	3/2	3/9	3/16	3/23	3/30	4/6
Calcium	15.7	17.0	19.4	20.2	15.0	22.5	25.1	21.7	21.4	16.9	14.9
Magnesium	0.9	0.78	1.15	1.14	1.66	1.66	1.43[a]	1.43[a]	1.43[a]	1.43	1.43
Total sulfur as sulfate	38.8	42.1	42.0	37.6	40.7	38.9	38.0	40.4	41.7	40.7	62.6
Acid insolubles	6.79	5.77	5.04	2.57	2.17	3.97	4.52	6.36	3.29	2.22	3.20
Carbonate, as CO_2	15.90	3.35	8.30	8.45	11.30	5.98	6.84	2.94	11.80	4.74	13.8
Free base as CaO[a]	<0.03	<0.03	-	<0.03	<0.03	-	-	-	-	-	-
Fixed carbon									2.34		

[a] Based on analysis of free base as CaO <0.03 in samples, assumed to be negligible in other samples.

TABLE 3-11. ANALYSES OF THICKENER UNDERFLOW SLURRY SOLIDS
(weight percent)

	Weekly composites					
Constituent	2/23	3/13	3/20	3/27	4/3	4/9
Calcium	14.4	23.6	20.8	20.3	17.8	14.8
Magnesium	0.94	1.43[a]	1.43[a]	1.43[a]	1.43[a]	1.43[a]
Total sulfate	41.6	38.4	38.3	40.8	41.0	40.8
Acid insolubles	3.93	4.65	9.03	2.63	1.98	3.63
Carbonate, as CO_2	6.91	8.95	4.29	11.40	4.22	10.40
Fixed carbon[b]	2.50	2.50	2.50	2.50	2.50	2.50

[a] Assumed value.

[b] Assumed value (from thickener inlet chemical analysis).

Note: Totals do not add up to 100% since water of hydration is not included and carbonate is actually present as CO_3.

underflow is a more concentrated solid form of the thickener inlet, it was assumed to contain about 2.50 weight percent of fixed carbon.

DISCUSSION OF RESULTS

General Comments

The test results verified that adipic acid did increase SO_2 removal efficiency at this limestone wet scrubbing facility. Because of the relatively short time remaining in the heating season after the program was started, the adipic acid concentration and pH level required to achieve high SO_2 had to be determined quickly. Initial concentrations of adipic acid in the 1000 to 1500 mg/liter range and a pH range of 4.6 to 5.0 resulted in an SO_2 removal efficiency of about 90 percent. To reach the 95 percent SO_2 removal level, 2000 to 2500 ppm adipic acid and a pH of 5.0 or greater were selected as the operating parameters. Because of the poor mist elimination in this scrubber and its open-loop mode (no pond liquor recycle), it was originally thought that the adipic acid concentration would have to be between 3500 and 4000 ppm; however, preliminary test data indicated a need for only 2000 to 2500 ppm. At this level, the scrubber achieved a mean of 94.3 percent SO_2 removal during the 30-day certified monitoring period.

During the 8 weeks of setup and testing, characteristics and composition of the flue gas fluctuated. During the cold weather (February to mid-March), when the heat load demand was high, the SO_2 concentration in the incoming flue gas ranged between 700 and 1200 ppm. Because the load demand was high, more hot gas was sent to the scrubber than later (mid-March to April 10), when the outside temperature was higher and the incoming flue gas temperature was lower. Also, during this later low-load period, the SO_2 concentration in the incoming flue gas (due to increased dilution) ranged between 400 to

900 ppm. Despite the stress put on its performance by the fluctuations in incoming SO_2 concentration and flue gas temperature, the scrubber maintained a high SO_2 removal efficiency during the test of the effects of adipic acid addition.

The design of the Rickenbacker unit is such that the stoker-fired boilers and the air mixing feature cause incoming flue gas to contain a high oxygen level (≅15.0 vol %). The effect of this high oxygen level was that the scrubber operated in a totally oxidized chemistry mode. The solids formed were essentially gypsum ($CaSO_4 \cdot 2H_2O$). The scrubber ran well, and no scaling problems were evident.

Effect of Adipic Acid on SO_2 Removal

The addition of adipic acid at the RANGB facility significantly improved the SO_2 removal efficiency of the scrubber. Table 3-12 compares test results of SO_2 removal achieved at RANGB during this test with those achieved during previous tests using only lime or limestone.

TABLE 3-12. COMPARISON OF TEST RESULTS - SO_2 REMOVAL AT RANGB

	Limestone	Lime	Limestone-adipic acid
Days of testing	42	29	30
Maximum % removal	87.3	96.0	97.4
Minimum % removal	51.0	86.6	90.0[a]
Average % removal	65.8	91.5	94.3[a]
Average boiler load, 10^6 Btu/h	-	109	101

[a] Using only certified monitor data and not counting days with reduced limestone feed.

The FGD scrubber at RANGB is atypical of FGD units used on industrial boilers and commercial lime/limestone units used by utilities. Its poor mist eliminator system and its lack of a reaction tank would cause one to expect both high adipic acid concentrations and high pH to be required to achieve the desired SO_2 removal efficiency. Actually, the required adipic acid concentration was not considered excessive and amounted to an average of 12 g/kg (24 lb/ton) of limestone. No correlation between adipic acid concentration and SO_2 removal were developed in this study because only a narrow range of the variables were investigated.

Slurry Solid Calculated Compositions

Chemical analyses were made of the solids portion of the limestone slurry feed stream, the thickener underflow stream, the thickener inlet stream, and the raw limestone feed, and the results were used to calculate the solids composition of the various streams. The percent solids in the various scrubber streams (shown in Table 3-13) were based on the density measurements presented in Appendix D.

Raw Limestone Calculated Compositions--

Table 3-14 presents the calculated chemical composition of the weekly composites of the limestone feed. Because the first weekly composite sample (dated 2/20) indicated the presence of only negligible amounts of either potassium (K) or sodium (Na), later limestone samples were not tested for these constituents. It was assumed that the total K and Na oxide content of the raw limestone was typically 0.8 weight percent. This table also compares the measured chemical analytical value for calcium carbonate versus a calculated value. The calculated value was derived by subtracting the known compositions (weight percent basis) from 100. The calculated $CaCO_3$ agrees with the 84 to 87 weight percent required by purchase specifications.

TABLE 3-13. PERCENT SOLIDS IN SLURRY STREAMS[a,b]

Date (1981)	Slurry feed	Mill pump outlet	Thickener inlet	Thickener underflow
2/13	NR[c]	8.3	11	11
2/14	14	11	13	8.3
2/16	NR	NR	NR	NR
2/17	15	17	13	27
2/18	18.5	18.5	14.5	23
2/19	17.5	14.5	13	19
2/20	19	18	15	26
2/23	15	15	NR	NR
2/24	16	16	15	1.12
2/25	19.5	NR	NR	NR
2/26	22	14	NR	NR
2/27	17.5	NR	NR	NR
2/28	18	NR	NR	NR
3/2	20	NR	NR	NR
3/3	15	15	16	36
3/4	17.5	15	NR	NR
3/5	17	17	NR	NR
3/6	18.5	18	NR	NR
3/7	21	NR	NR	NR
3/9	18	18	NR	NR
3/10	18	17	17	NR
3/11	18	17	NR	NR
3/12	17.5	19	NR	NR
3/13	19	18	NR	24
3/14	17	NR	NR	NR
3/15	20	NR	NR	NR
3/16	18	18	NR	NR
3/17	15	15	NR	NR
3/18	17.5	17.5	NR	NR
3/19	12.5	13	NR	NR
3/20	17.5	17	NR	NR
3/23	20.5	18	NR	NR
3/24	19	17	15	25
3/25	18	17	NR	NR
3/26	19	17	NR	NR
3/27	19	18	NR	NR
3/30	13.5	14	NR	NR
4/2	17.5	18	NR	NR
4/3	19	22	NR	NR
4/6	18.5	18	NR	NR
4/7	17	13	10	47
4/8	18.5	18	NR	NR
4/9	18.5	19	NR	NR
4/10	18	17	NR	NR

[a] The weight percent solids are calculated by the following formula:

$$\text{Density} = \frac{1}{1 - w\,(1 - \frac{1}{\rho s})}$$

where: w = weight percent of solids in the slurry
ρs = specific gravity of solids = 2.5 (assumed)

$$\text{Thus: Density} = \frac{1}{1 - 0.6\,w}$$

[b] Some values are averages of two values.

[c] NR - not recorded.

TABLE 3-14. CALCULATED LIMESTONE CHEMICAL COMPOSITION
(weight percent)

Component	Weekly composites							
	2/20	2/27	3/6	3/13	3/20	3/27	4/3	4/10
K and Na → oxide[a]	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.8
Mg → $MgCO_3$	8.4	10.1	10.5	9.9	10.1	8.8	9.0	9.0
Acid insolubles	1.5	0.8	2.8	4.1	5.1	2.1	2.0	2.5
Calculated $CaCO_3$ by difference	89.3	88.3	85.9	85.2	84.0	88.3	88.2	87.7
Reported $CaCO_3$ (Table 3-8)	87.5	91.5	76.5	79.2	78.2	87.8	80.3	79.0
Error,[b] %	1.8	-3.6	10.9	7.0	6.9	0.6	9.0	9.9

[a] K and Na were verified as low; therefore, assumed total K and Na present as oxides to be 0.8 wt %.

[b] $\dfrac{\text{Calculated Ca } CO_3 - \text{reported } CaCO_3}{\text{Calculated } CaCO_3}$

Limestone Feed Slurry Calculated Composition--

Table 3-15 presents the calculated chemical composition of the limestone feed slurry solids. The magnesium fraction was assumed to be 1.43 weight percent, and the calculated $MgCO_3$ fraction was assumed to be 5.00 weight percent, based on the analytical results determined for the thickener inlet solids. The calculated chemical composition of the solids is based on the assumption that all of the sulfur is present as gypsum and that magnesium is present as $MgCO_3$. Then the calcium carbonate ($CaCO_3$) can be determined by subtracting the known compositions (weight percent basis) from 100.

Table 3-16 presents an error analysis of the reported chemical analytical value for Ca versus a calculated Ca value derived from the calculated gypsum and $CaCO_3$ results. The error range of 5.0 to 35.4 is not unreasonable because this approach directs all of the potential error into the reported Ca value. The nature of taking weekly composites for these types of slurry streams makes it impossible to assure the homogeneity of the sample for use as a calculation basis. The aliquot dilution procedure used to analyze for Ca and Mg on the Atomic Absorption instrument also leads to some error.

Thickener Underflow Calculated Composition--

Table 3-17 presents the calculated chemical compositions of the weekly composites of the thickener underflow stream. Because the slurry around the thickener ran "soot black" in color and the unburned carbon analysis was in the 2.50 weight percent range, the thickener underflow was assumed to contain this fraction of fixed carbon. Again, the $CaCO_3$ was calculated by subtracting the known composition (weight percent basis) from 100.

TABLE 3-15. WEEKLY COMPOSITION OF CALCULATED LIMESTONE FEED SLURRY SOLIDS
(weight percent)

Component	3/12	3/19	3/27	4/3	4/9
$SO_4 \rightarrow CaSO_4 \cdot 2H_2O$	68.80	78.83	76.86	73.64	77.94
$Mg \rightarrow MgCO_3$	*5.00	*5.00	*5.00	*5.00	*5.00
Acid insolubles (Table 3-9)	4.65	6.59	3.35	2.30	2.94
Calculated $CaCO_3$	21.55	9.58	14.79	19.06	14.12

*Assume Mg at 1.43 weight percent from thickener inlet analysis.

TABLE 3-16. ERROR ANALYSIS OF REPORTED VERSUS CALCULATED CALCIUM VALUES FOR LIMESTONE FEED SLURRY
(Weight percent except as noted)

Component	3/12	3/19	3/27	4/3	4/9
Calculated $Ca \leftarrow CaSO_4$	16.00	18.33	18.34	17.13	18.13
Calculated $Ca \leftarrow CaCO_3$	8.62	3.83	5.92	7.62	5.65
Total calculated Ca	24.62	22.16	24.26	24.75	23.78
Reported Ca (Table 3-9)	23.4	19.9	20.2	16.0	15.9
Error,[a] %	5.0	10.2	16.7	35.4	33.1

[a] $\frac{\text{Calculated Ca - reported Ca}}{\text{Calculated Ca}}$

TABLE 3-17. CALCULATED WEEKLY COMPOSITION OF THICKENER UNDERLFOW STREAM (Weight percent)

Component	2/23	3/13	3/20	3/27	4/3	4/9
$SO_4 \rightarrow CaSO_4 \cdot 2H_2O$	74.53	68.30	68.62	73.10	73.46	73.10
$Mg \rightarrow MgCO_3$	3.29	*5.00	*5.00	*5.00	*5.00	*5.00
Acid insolubles	3.93	4.65	9.03	2.63	1.98	3.63
Fixed carbon	2.50	2.50	2.50	2.50	2.50	2.50
Calculated $CaCO_3$	15.75	19.05	14.85	16.77	17.06	15.77

*Assume Mg at 1.43 weight percent.

TABLE 3-18. ERROR ANALYSIS OF REPORTED VERSUS CALCULATED CALCIUM VALUES FOR THICKENER UNDERFLOW STREAM

Component	2/23	3/13	3/20	3/27	4/3	4/9
$Ca \leftarrow CaSO_4$	17.33	16.00	15.96	17.00	17.08	17.00
$Ca \leftarrow CaCO_3$	6.30	7.62	5.94	6.80	6.82	6.31
Total calculated Ca	23.63	23.62	21.90	23.80	23.90	23.31
Reported Ca (Table 3-11)	14.4	23.6	20.8	20.3	17.8	14.8
Error,[a] %	39.1	0	5.0	14.7	25.5	36.5

[a] $\frac{\text{Calculated Ca - reported Ca}}{\text{Calculated Ca}}$

The error analysis for the thickener underflow (presented in Table 3-18) is similar to that described for the limestone feed slurry. An error range of 0 to 39.1 percent was found.

Thickener Inlet Solids Calculated Composition--

Table 3-19 presents the calculated chemical composition of the thickener inlet stream, which was also used as the basis for calculating the limestone stoichiometric ratio and its reciprocal limestone utilization percent. Again, based on the same approach, calcium carbonate was determined as the difference from 100 of the sum of the other components.

Table 3-20 presents the error analysis for the thickener inlet stream. This analysis is based on the assumption that all the error shows up in the reported Ca value. An error range of 3.9 to 36.4 was determined when using this approach.

Interestingly, the greatest error occurs when the reported Ca value is less than 19.0 weight percent. This is true in the case of the thickener inlet, the weekly limestone feed slurry compositions, and the weekly thickener underflow compositions. The weekly compositions in March show the reported Ca values to be greater than 21.0 weight percent and the error analysis to be in close agreement, which is why these values were used to calculate limestone utilization.

Percent Sulfate Saturation

The percent sulfate saturation is also known as the gypsum relative saturation (RS). In a limestone FGD system, gypsum ($CaSO_4 \cdot 2H_2O$) can precipitate on scrubber internals, especially on the mist eliminators. If the concentration of calcium ion (Ca^{++}) or sulfate ion ($SO_4^=$) in the liquid phase increases beyond the following equilibrium, it becomes supersaturated.

TABLE 3-19. CALCULATED COMPOSITIONS OF THICKENER INLET STREAM
(Weight percent)

Components	Daily value					Weekly composites					
	2/11	2/12	2/18	2/25	2/27	3/2	3/9	3/16	3/22	3/30	4/6
$SO_4 \rightarrow CaSO_4 \cdot 2H_2O$	69.52	75.43	75.25	67.37	72.92	69.70	68.08	72.38	74.71	72.92	76.33[a]
$Mg \rightarrow MgCO_3$	3.15	2.73	4.03	3.99	5.81	5.81	5.00	5.00	5.00	5.00	5.00
Acid insolubles	6.79	5.77	5.04	2.57	2.17	3.97	4.52	6.36	3.29	2.22	3.20
Fixed carbon	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.34	2.50	2.50	2.50
Calculated $CaCO_3$	18.04	13.57	13.18	23.57	16.60	18.02	19.90	13.92	14.50	17.36	12.97

[a] Used 42.6 as value for total sulfate as reported value of 62.6 converts to $CaSO_4$ at more than 100%.

TABLE 3-20. ERROR ANALYSIS OF REPORTED VERSUS CALCULATED CALCIUM VALUES FOR THICKENER INLET STREAM
(weight percent except as noted)

Components	Daily value					Weekly composites					
	2/11	2/12	2/18	2/25	2/27	3/2	3/9	3/16	3/22	3/30	4/6
Calculated $Ca \leftarrow CaSO_4$	16.17	17.54	17.50	15.67	16.96	16.21	15.83	16.83	17.37	16.96	17.75
Calculated $Ca \leftarrow CaCO_3$	7.22	5.43	5.27	9.43	6.64	7.21	7.96	5.77	5.80	6.94	5.19
Total calculated Ca	23.39	22.97	22.97	25.10	23.60	23.42	23.79	22.60	23.17	23.90	22.94
Reported Ca (Table 3-10)	15.7	17.0	19.4	20.2	15.0	22.5	25.1	21.7	21.4	16.9	14.9
Error,[a] %	32.9	25.1	14.8	19.5	36.4	3.9	-5.5	4.0	7.6	29.3	35.0

[a] $\dfrac{\text{Calculated Ca - reported Ca}}{\text{Calculated Ca}}$

$$CaSO_4 \cdot 2H_2O_{(s)} \rightleftarrows Ca^{++} + SO_4^{=} + 2H_2O$$

Then, the scaling potential can be expressed by using the gypsum relative saturation (RS) value as the scaling parameter.

$$RS = \frac{a_{Ca^{++}} \times a_{SO_4^{=}}}{K_{sp(CaSO_4 \cdot 2H_2O)}}$$

where RS = gypsum relative saturation

a = activity of an ion species in solution

K_{sp} = solubility product of gypsum

If the RS value of a stream exceeds 1.3, probability is high that gypsum scaling is occurring in the equipment associated with that stream.

Relative saturation can be calculated by using the following basic equations:

$$RS = C_{Ca^{++}} \times C_{SO_4^{=}} \left[\frac{263}{I} + 47\right]$$

where $I = 3[C_{Ca^{++}} + C_{Mg^{++}}] + C_{SO_4^{=}}$

and is equal to the ionic strength in solution containing only the following ions:

$$Ca^{++},\ Mg^{++},\ SO_4^{=} \text{ and } Cl^{-}$$

and where C = molarities (as g-mole/liter) of

$$Ca^{++},\ Mg^{++}, \text{ and } SO_4^{=}$$

Table 3-21 summarizes the pH, adipic acid concentration, calculated RS values, and the percent error in the ionic balance of the limestone slurry feed stream. The RS values were calculated by using an EPA version of the BMREP, which accounts for adipic acid.

The RS values were close to or greater than 130 percent from March 3 through March 16, but no scaling was indicated, either by an increase in pressure drop across the scrubber's internal mist eliminator or by observation of gypsum crystal growth on a clean stainless steel fitting placed in the open trough that handled the thickener inlet stream.

Error Analysis--

The chloride ion (Cl^-) was found to be about 33 percent too high as a result of problems with the specific chloride ion electrode analysis in the field. These high chloride results would contribute to the high calculated RS values and explain why no physical scaling effects were noted. The pH was lowered March 17 through March 19 to avoid the potentially damaging effect of scaling.

As part of the error analyses, the BMREP computer program calculated the percent error in the ionic balance for each day of input data used to calculate the RS values. Table 3-21 indicates an imbalance for some days of as much as 40 to 50 percent in the negative direction. This means that the analysis showed more negative equivalents than positive. Physically, the negative ions are equal (in balance) to the positive ions at all times. Therefore, this calculation verified the high chloride (negative) ion measurement problem. The calculation also verified the accuracy of the mercurous nitrate chloride ion results determined in April as evidenced by the low percent error in the ionic balance.

TABLE 3-21. SUMMARY OF pH, ADIPIC ACID CONCENTRATION, PERCENT ERROR IN IONIC BALANCE, AND GYPSUM-RELATIVE SATURATION OF THE LIMESTONE SLURRY FEED STREAM

Date (1981)	RS, %	Adipic acid concentration, mg/liter	pH	Percent error in ionic balance
2/13	83.2	107	5.01	-28.3
2/14	55.4	121	4.14	-21.0
2/16	81.7	121	~3.5	-35.7
2/17	90.6	300	5.85	-41.0
2/18	84.2	1,640	5.34	-30.9
2/19	84.0	1,240	4.80	-40.1
2/20	80.9	1,390	5.02	-42.8
2/23	98.1	1,020	5.04	-40.0
2/24	101.4	1,015	4.67	-41.3
2/25	96.2	1,160	4.73	-55.9
2/26	107.9	1,820	4.84	-49.7
2/27	101.7	2,315	4.35	-59.1
3/3	128.0	1,825	4.87	-51.2
3/4	123.5	2,305	4.74	-29.4
3/5	127.0	2,920	4.93	-43.0
3/6	138.5	2,090	4.71	-9.9
3/9	126.7	1,770	5.03	-42.0
3/10	147.5	2,165	4.98	-42.4
3/11	137.7	1,890	4.84	-25.4
3/12	151.1	1,855	4.91	-29.2
3/13	151.3	1,585	4.91	-41.1
3/16	127.0	1,890	4.76	-52.7
3/17	94.1	1,920	4.25	-34.3
3/18	89.4	2,390	4.33	-20.4
3/19	102.5	2,430	4.26	-14.2
3/20	82.9	3,000	5.2	-12.3
3/22	79.8	2,420	5.38	-7.4
3/23	80.9	2,090	5.07	-32.4
3/24	80.2	2,200	4.68	-11.0
3/25	84.7	2,240	5.2	-7.9
3/26	90.4	2,150	5.3	-22.3
3/27	90.2	2,130	5.0	-27.7
3/30	98.0	1,920	4.9	-13.5
4/1	103.6	830	5.8	-1.7
4/2	92.7	1,950	5.5	7.9
4/3	109.5	2,040	4.8	1.4
4/4	101.3	2,160	4.7	13.0
4/6	104.5	2,170	5.2	1.7
4/7	103.3	2,820	5.1	-2.4
4/8	97.8	2,850	5.05	-0.4
4/9	82.1	2,570	4.6	11.6
4/10	84.8	2,400	4.7	14.9

The nature of data collected at Rickenbacker is such that correlation analysis between RS, adipic acid concentration, and pH would be difficult. Because such a correlation was not the project goal, RS-derived values were used as a process control parameter to monitor the scaling potential risk.

Limestone Utilization (Stoichiometric Ratio)

Limestone utilization, expressed as a percentage, can be calculated for those streams for which analyses of both liquid- and solid-phase concentrations of Ca, Mg, and total sulfate (SO_4) have been made. The thickener inlet slurry stream was selected for this determination. Limestone utilization (LU) is defined as the reciprocal of the stoichiometric ratio (SR) as

$$\%\ LU = \frac{1}{SR}$$

The stoichiometric ratio can be calculated by the following equation:

$$SR = \frac{Ca/40}{SO_4/96}$$

where: Ca and SO_4 are reported as weight fractions (determined by chemical analytical procedure) in the solids of the thickener inlet slurry.

This method neglects liquid-phase concentrations of Ca, Mg, and SO_4. A more rigorous method would require that these concentrations be known, along with slurry density data, in order to calculate the total concentrations of species in the slurry stream.

Table 3-22 summarizes the calculated stoichiometric values and limestone utilization percentages for thickener inlet stream solids, based on both reported Ca weight percents and calculated Ca (as described earlier). These data cover both the early monitoring and the continuous monitoring program. An evaluation of the March weekly composites shows that the limestone stoichiometric ratios based on reported Ca and those based on calcu-

TABLE 3-22. STOICHIOMETRIC RATIO AND UTILIZATION OF LIMESTONE BASED ON THICKENER INLET STREAM SOLIDS CONTENT

	Daily values					Weekly composites					
	2/11	2/12	2/18	2/25	2/27	3/2	3/9	3/16	3/23	3/30	4/6
Reported Ca, wt %	15.7	17.0	19.4	20.2	15.0	22.5	25.1	21.7	21.4	16.9	14.9
Mg, wt %	0.90	0.78	1.15	1.14	1.66	1.66	1.43	1.43	1.43	1.43	1.43
Total SO_4, wt %	38.8	42.1	42.0	37.6	40.7	38.9	38.0	40.4	41.7	40.7	40.0[a]
Adipic acid in liquid, ppm	~100	~100[b]	1640	1160	2315	1870	1750	2425	2155	1980	2170
pH	3 to 4.5[c]		5.3	4.75	4.35	4.75	4.9	4.75	5.1	4.9	5.2
Stoichiometric ratio (SR)	1.06	1.04	1.21	1.41	1.05	1.58	1.74	1.43	1.37	1.14	1.04
Utilization, % ($\frac{1}{SR}$ as %)	94.3	96.2	82.3	70.9	95.2	64.1	57.5	70.0	73.0	87.7	96.2
Calculated Ca, wt %	23.4	23.0	23.0	25.1	23.6	23.4	23.8	22.6	23.2	23.9	22.9
SR (based on calculated Ca)	1.54[d]	1.39[d]	1.42	1.72	1.55	1.61	1.65	1.48	1.47	1.55	1.42
Utilization, % calculated Ca	64.9	71.9	70.4	58.1	64.5	62.1	60.6	67.6	68.0	64.5	70.4

[a] Assumed value for calculation purposes.
[b] Based on data from 2/13.
[c] Based on panel board date.
[d] Values appear high in light of low pH; use reported values.

lated Ca were in close agreement. The typical SR range was 1.35 to 1.65 and the corresponding limestone utilization percentage was 60 to 75 percent.

Based on only the "as reported" chemical analysis data for the first two days (February 11 and 12) on which solid samples were drawn and on an SO_2 removal efficiency of 50 to 60 percent, SR values are low because of low SO_2 removal efficiency and very low system pH (3.1 to 4.5). The SR values for the remaining samples, especially the weekly composites, ranged from 1.04 to 1.74. If only the SR values based on the calculated calcium weight fraction are considered, the range was fairly consistent (1.39 to 1.65), with only one high value (1.72).

The weekly composite samples consist of a mixture of at least three daily samples, which probably explains the reason for the close agreement between SR values based on reported Ca and those calculated by Ca weight fractions. The lack of homogeneity that can occur in samples, especially when working with solids, could explain the large discrepancy among the daily samples.

The data indicate that limestone utilization was usually in the 60 to 75 percent range during the high SO_2 removal period in March. This appears to be a poor limestone utilization rate; however, this range may well be optimum, given the mechanical and design drawbacks of the Rickenbacker scrubber and its lack of pond-return liquor.

Because the baseline data were not optimum (pH was 3. to 4.5 instead of the optimum 5.5 to 5.8), a valid evaluation of limestone consumption before and after adipic acid addition could not be made. However, it can be seen that SO_2 removal increased at relatively constant limestone utilization rates when adipic acid was added.

Error Analysis--

Based on the approach used in determining the calculated Ca values (as described earlier), Table 3-23 presents the differences between the SR based on reported Ca values and that for calculated Ca values. These differences ranged from 1.9 to 32.2 percent. Again, the highest difference was found to be when the reported Ca was low ($\leq$17.0). As a result of the aliquot dilution procedure used to make the sample come into range of the Atomic Absorption (AA) analyses, the errors experienced are not totally unexpected. The nonhomogeneity of one sample drawn to represent a daily composite could also contribute a large error.

Nevertheless, the data show the March weekly composite samples to be in close agreement, and these were assumed to be most representative of high SO_2 removal results at Rickenbacker.

TABLE 3-23. ERROR ANALYSIS OF LIMESTONE UTILIZATION VALUES BASED ON THICKENER INLET CHEMICAL ANALYSIS[a]
(percentages)

						Weekly composites					
	2/11	2/12	2/18	2/25	2/27	3/2	3/9	3/16	3/23	3/30	4/6
Difference between SR based on reported Ca and SR based on calculated Ca values	31.1	25.2	14.8	18.0	32.2	1.9	5.5	3.4	6.8	26.5	26.8

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[a] $\frac{\text{Calculated Ca - Reported Ca}}{\text{Calculated Ca}} \times 100 = \%$ difference

REFERENCES FOR SECTION 3

1. Federal Register. Vol. 44, No. 113. June 11, 1979. p. 33623.

2. Emission Test Report. Rickenbacker Air Force Base. Volume 1. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. August 1979.

3. PEDCo Environmental, Inc. Continuous Sulfur Dioxide Monitoring of the Industrial Boiler System at Rickenbacker Air Force Base. Vol. I. Environmental Protection Agency Contract No. 68-02-2811, Assign. 27. June 1980. p. 2-1.

SECTION 4

MEASUREMENT PROCEDURES

TEST PROCEDURES

The adipic acid test period at RANGB, including setup and calibration of the necessary equipment and collection of the data, extended from February 9 to April 10, 1981. Although the monitoring equipment began operating on February 13, the first few weeks of the test period were used for shakedown and calibration of the monitors. Data collection included measurements of SO_2 and O_2 concentrations in the gas stream at the scrubber inlet and outlet and chemical analyses of the scrubber slurry, limestone, and coal. Scrubber and boiler operating conditions were recorded several times daily.

Continuous Emission Monitoring

The continuous emission monitoring (CEM) system consisted of a DuPont Model 460 SO_2 analyzer, a Thermox WDG-P oxygen analyzer, and an Apple II microcomputer. The DuPont analyzer was part of the plant's SO_2 monitoring system, whereas the oxygen analyzer and microcomputer were assembled specifically for this test program. The CEM system sampled the inlet and outlet gas streams of the scrubber. Samples, which were extracted semicontinuously through heated Teflon lines, were drawn alternately from the inlet and outlet every 5 minutes for analysis by the monitors. A constant-temperature water trap controlled the moisture in the sampled gas stream. The computer recorded gas concentrations every 10 seconds and stored the information on a magnetic disk. This system was programmed to calculate the emission rates in mass/gross heat input units and the SO_2 removal efficiency for each complete 10-minute cycle. Data were also recorded on strip charts.

The CEM system collected useable data between March 4 and April 10. Nearly 80 percent of this 38-day period (30 days of at least 18 hours of data) showed a scrubber efficiency of 90 percent or better. Scrubber availability was 95 percent, and CEM availability was 85 percent during this test period. Four consecutive days of data (March 16 to 19) were not included in the summary because the scrubber was being operated at low limestone feed rates during an investigation of possible scaling.

Slurry Sampling and Analysis

Slurry analyses were performed at the site, but periodic samples were checked at the base lab for quality control. Liquid samples were taken from 1) the limestone slurry feed into the scrubber, 2) the second-stage level tank, 3) the mill recycle loop (known as the mill pump sample), 4) the thickener inlet stream, 5) the thickener overflow, and 6) the thickener underflow stream. Because the limestone slurry feed sample served as a control sample, it was taken twice per day. The mill pump sample was taken once per day, and samples were taken from all six locations once a week. Slurry solid samples, taken by filtering samples from the liquid sample streams, included the limestone slurry feed (once a week), the thickener inlet (three per week), and the thickener underflow (once a week, usually while sludge was being pumped to the settling pond). Coal samples were taken once a day and combined into weekly composites for analysis. Limestone samples were taken once a week.

The slurry samples were pressure filtered with nitrogen through 1.2 μm Acupor membrane to obtain a clear filtrate which was analyzed for dissolved constituents. Because of their time dependency, three analyses (sulfite, pH, and alkalinity) were performed immediately. The remaining six analyses [density, total sulfur as sulfate, calcium, magnesium (hardness), chloride, and adipic acid] were performed as soon as possible.

All analyses were based on standard methods[1,2,3] as follows:

1. A standardized electrode with a calibrated meter was used to determine pH.
2. Slurry density was determined by weighing a known volume of slurry.
3. Fifty milliliters of slurry was titrated with a standard 0.1N hydrochloric acid solution until a pH of 4.2 was reached, and total alkalinity was calculated and expressed as ppm $CaCO_3$.
4. Samples for adipic acid (actually total carboxylic acids) were filtered, acidified, and absorbed on silicic acid. The acids were eluted with butanol in chloroform and titrated with a standard 0.2N sodium hydroxide solution. The results were calculated as adipic acid, which served as a standard.
5. Calcium and magnesium were determined by titration and precipitation. The slurry was filtered and the clear liquor containing both calcium and magnesium was titrated with standard EDTA at a pH of 10.0. The result was expressed as ppm calcium carbonate ($CaCO_3$) equivalent or total hardness. Another portion of clear liquor was analyzed for calcium after the magnesium was removed from solution by precipitation as the hydroxide at pH 13. The calcium that remains was titrated with standard EDTA solution, and the hardness equivalent of the calcium concentration was subtracted from the total hardness to give the hardness equivalent of the magnesium.
6. The chloride concentration was determined by using a chloride-ion specific electrode in filtered liquids. (After working with the specific electrode in the field, PEDCo Environmental, Inc., would suggest the use of the ASTM method that titrates the filtered liquor with mercurous nitrate to arrive at accurate chloride concentration values.)
7. The sulfite concentration was determined immediately after drawing and filtering the slurry sample because air oxidizes the sulfite to sulfate. Sulfite of the clear filtered liquor was determined by titration with standard iodide-iodate reagent to a blue starch end-point.
8. The sulfate concentration was determined by oxidizing all the sulfur present in the filtered slurry liquor into the sulfate form by using hydrogen peroxide. The oxidized sample was contacted with cation-exchange resin to remove interfering cations. The solution was then scrubbed with N_2 to remove CO_2, and the resin

was allowed to settle. The solution was then separated from the resin and titrated with a standard barium perchlorate solution by using a Thorin indicator. Total sulfur was calculated from the amount of barium perchlorate used and reported as ppm of sulfate.

Accuracy Checks for Slurry Analyses

Routine quality controls were applied to all chemical analyses made in the field. All reagents were ACS grade or better, and all volumetric glassware was Class A. Whenever possible, commercially available standard solutions were used, and their standardization was verified with independently prepared control samples. In addition, a duplicate determination was made to assess the analytical precision of each analysis at least once a day.

Accuracy was routinely monitored through control samples and verified by audits according to the following scheme:

- Twice during the course of the project, a series of audit samples was shipped to the field for analysis. This audit included all nine field analyses.
- Periodically, selected samples were shipped to the base laboratory for analysis by standard procedures that differed from those used in the field. These included calcium and magnesium by atomic absorption spectrophotometry, turbidimetric sulfate, titrimetric chloride, and adipic acid by ion chromatography. Density, pH, alkalinity, and sulfite were not included in this phase of the audit.

Samples of coal, limestone, and slurry solids were returned to the base laboratory. Calcium, magnesium, sodium, and potassium were analyzed by atomic absorption spectrophotometry, and sulfate was analyzed turbidimetrically. Standard ASTM procedures were utilized for the proximate and ultimate coal analyses.[4] These base laboratory analyses included 10 percent duplicate analyses, as well as an analysis of a standard reference solution (SRS) with each batch of 10 samples or less.

Research Triangle Institute independently checked the analytical data and found them to be acceptable except for some chloride values that were 10 to 30 percent high. These chloride concentrations had been measured by the specific ion electrode method. PEDCo confirmed these high readings and switched to a mecuric nitrate method on April 1. (Lack of the necessary reagent prevented earlier use of this method.) Because the chloride samples were analyzed onsite and then disposed of, the samples could not be rechecked.

The silicic acid procedure for adipic acid yielded low but consistent recoveries in the 59 to 64 percent range. Attempts to improve the recovery by using metasilicic acid resulted in higher but more variable recoveries. Because of its consistency, the lower recovery method was used throughout the test period and the results were corrected for the low recovery.

Sulfate analyses also were checked in detail in the field and at the base laboratory. Reported results are within 10 percent of the true value.

PERFORMANCE AND SPECIFICATION TESTS OF THE CONTINUOUS MONITOR

Complete performance and specification (P/S) tests were performed during the test period to ensure that CEM data was equivalent to data from manual reference method tests. Tables 4-1 and 4-2 summarize results of these P/S tests. These data show that the monitors met U.S. EPA specifications for continuous monitoring.

The P/S tests were conducted in a manner that either met or exceeded the requirements specified in the October 10, 1979, Federal Register, Title 40CFR60, Appendix B. The only departure from these guidelines was the selection of a reduced operating range for the O_2 analyzer, which imposed even higher standards on the analyzer's performance.

Sampling Locations

Both inlet and outlet CEM and manual reference method sampling points were chosen to be representative of the process streams tested and to assure

TABLE 4-1. SUMMARY OF PERFORMANCE SPECIFICATION RESULTS FOR THE SO_2 MONITOR

Test parameter	Required performance specifications	Performance testing results		
System relative accuracy	$\leq$20% of the mean value of the reference method test data or $\leq$10% of the applicable standard in mass per gross calorific value	Inlet:	Initial	8.0%
			Final	12.1%
		Outlet:	Initial	16.6%
			Final	37.2%
Calibration error	$\leq$5% of each (50% of span, 90% of span) calibration gas mixture	High range:	High	0.66%
			Mid	1.3%
		Low range:	High	1.16%
			Low	1.25%
Zero drift (2-h)	2% of span	High range:		0.105%
		Low range:		0.36%
Zero drift (24-h)	2% of span	High range:		0.64%
		Low range:		1.38%
Calibration drift (2-h)	2% of span	High range:		0.504%
		Low range:		0.76%
Calibration drift (24-h)	2.5% of span	High range:		0.81%
		Low range:		1.21%
Conditioning period	168-h minimum			168 h
Operational period	168-h minimum			168 h
Response time	15-min maximum	High range:		2.6 min
		Low range:		2.73 min

TABLE 4-2. SUMMARY OF PERFORMANCE SPECIFICATION RESULTS FOR THE O_2 MONITOR

Test parameter	Required performance specifications	Performance testing results
Calibration error	≤5% of the mean value of the reference method test data	High range: 1.79% Mid range: 2.11%
Zero drift (2-h)	≤0.4%	0.127
Zero drift (24-h)	≤0.5%	0.174
Calibration drift (2-h)	≤0.4%	0.156
Calibration drift (24-h)	≤0.5%	0.158
Operational period	168-h minimum	168 h
Conditioning period	168-h minimum	168 h
Response time	10-min maximum	2.1 min at inlet 2.3 min at outlet

equivalence between manual method and CEM samples. Equivalence was achieved in both cases by choosing sampling points centrally located in the ducts at the furthest accessible points downstream from possible process interferences (see Figures 4-1 and 4-2). After the CEM system was operable, stratification tests were conducted at both sampling locations. The ducts were traversed to determine gas velocity, and SO_2 and O_2 concentrations were measured at the points shown on Figure 4-3. The results (presented in Table 4-3) show that the selected sampling locations were representative of the gas stream. The manual method samples required for P/S testing were drawn from points adjacent to the CEM probes (see again Figures 4-1 and 4-2).

Conditioning Period

The conditioning period started at 1300, March 26, 1981, and ended at 1400, April 2, 1981. During this period the CEM was operated in the same manner as during the test period; no maintenance, repairs, replacements, or adjustments took place other than those specified as routine and required by operation and maintenance manuals or the manufacturers' representatives.

Operational Test Period

The CEM was operated from 1300 April 3 through April 10, 1981; no maintenance, repairs, replacement, or adjustments took place except the clearly routine or those required by manufacturers' specifications. During this period, P/S test data and emissions data were collected.

CONTINUOUS EMISSION MONITORING SYSTEM CALIBRATION

The DuPont 460 SO_2 analyzer was initially set up and calibrated by using certified SO_2/N_2 cylinders provided by EPA's Environmental Monitoring Systems Laboratory, Quality Assurance Division (EMSL-QAD). These certified gases were also used, along with others, for the biweekly system audit. The

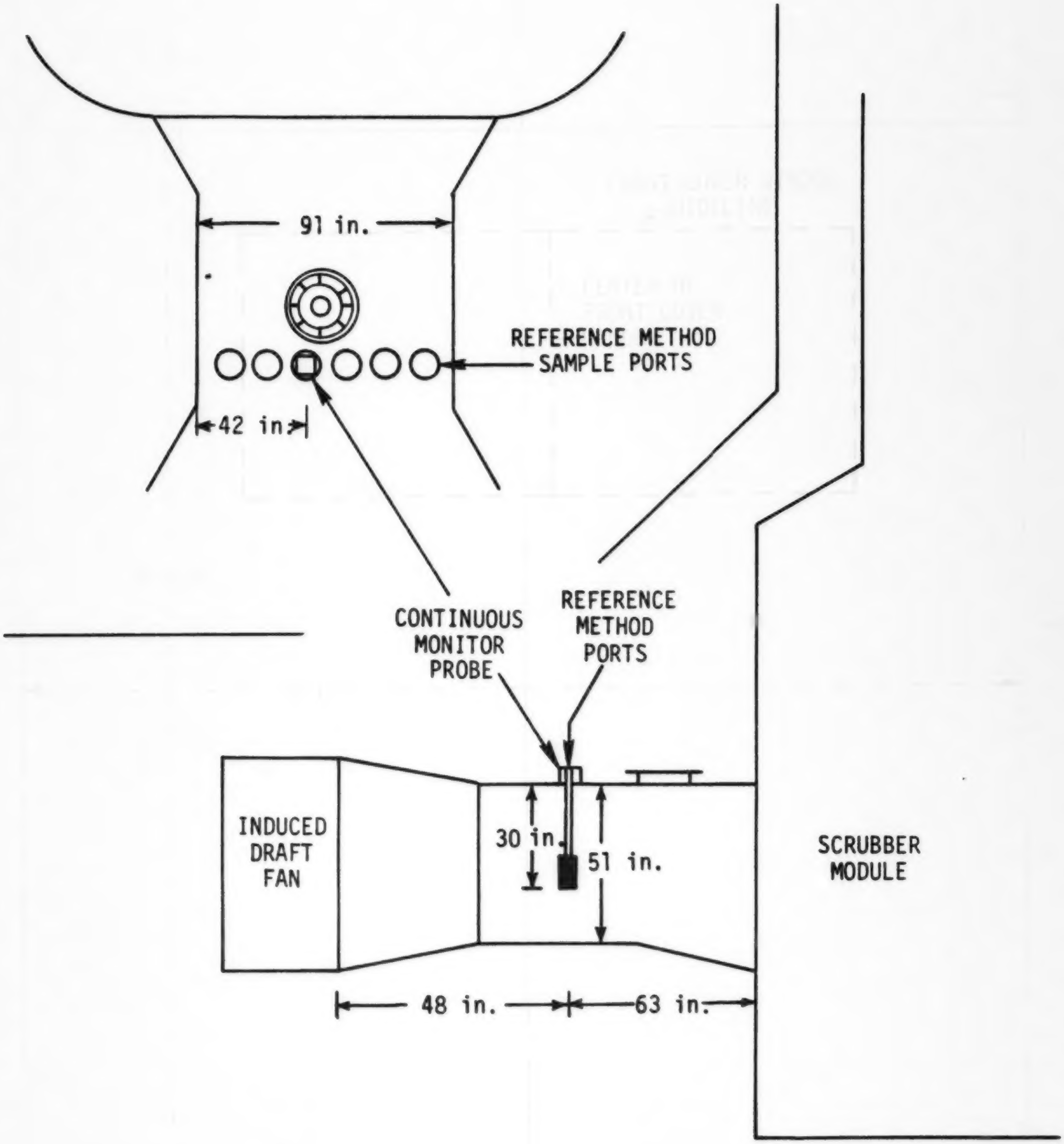

91 in.
REFERENCE METHOD SAMPLE PORTS
42 in.
CONTINUOUS MONITOR PROBE
REFERENCE METHOD PORTS
INDUCED DRAFT FAN
30 in.
51 in.
SCRUBBER MODULE
48 in.
63 in.

Figure 4-1. Scrubber inlet sampling locations.

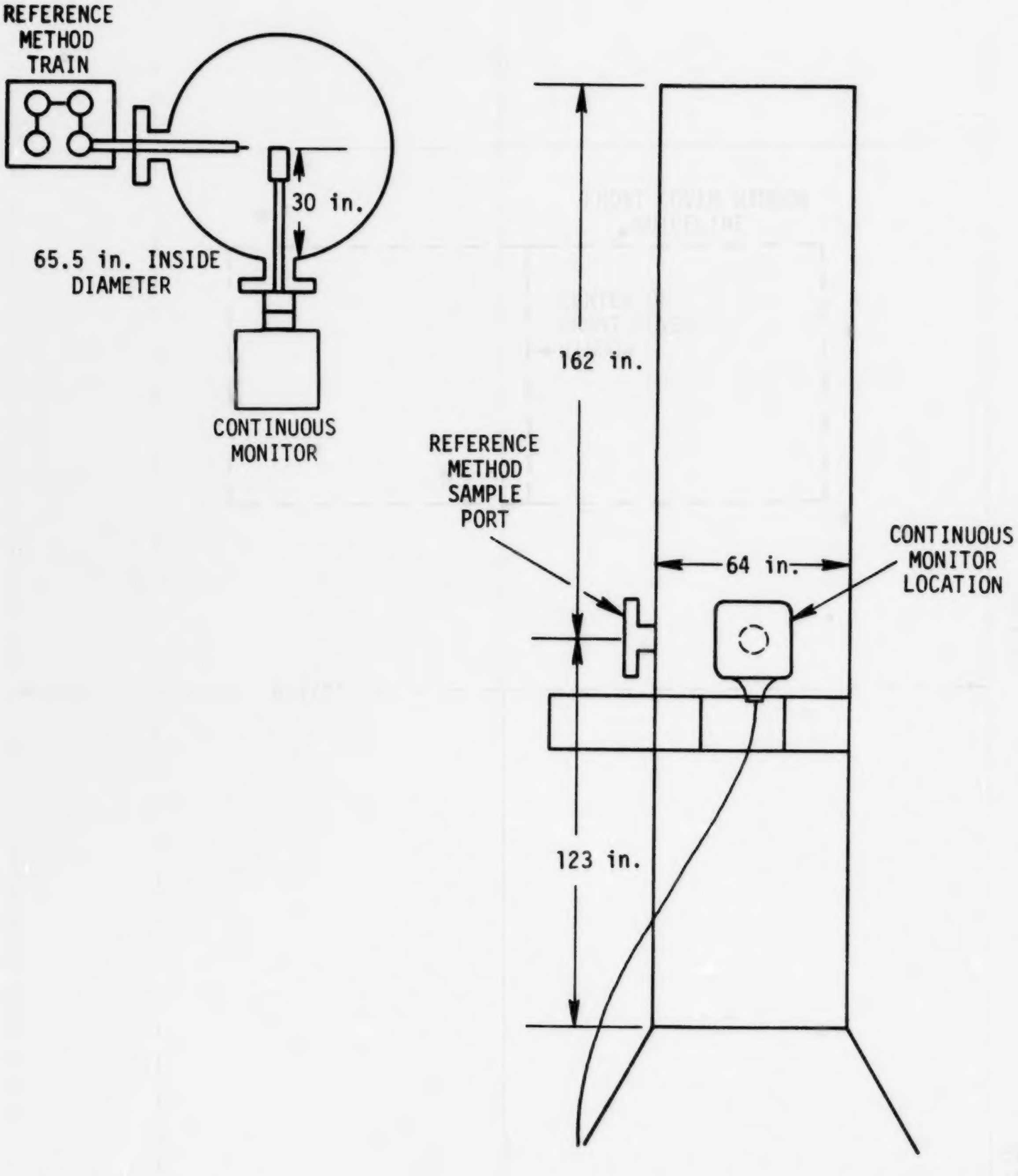
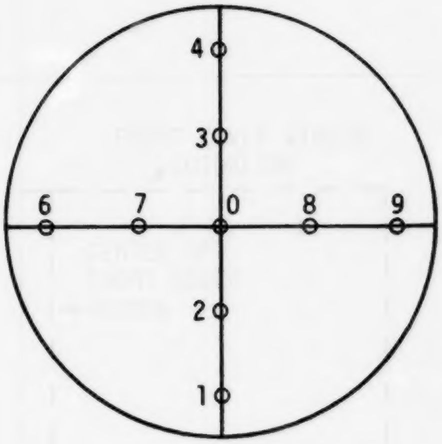
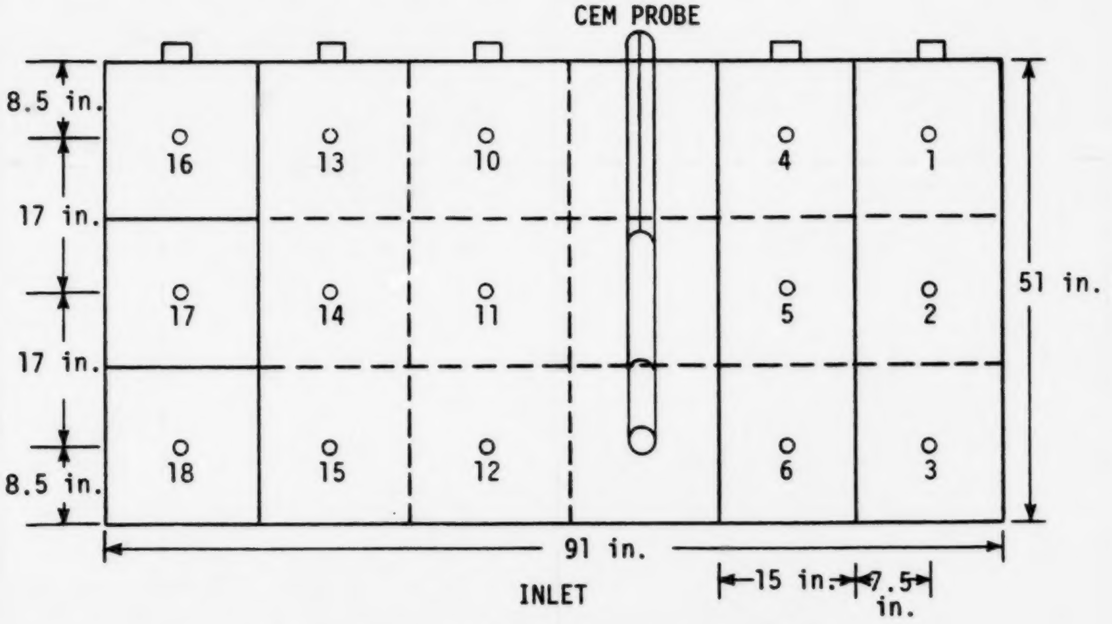

REFERENCE
METHOD
TRAIN
30 in.
65.5 in. INSIDE
DIAMETER
CONTINUOUS
MONITOR
162 in.
REFERENCE
METHOD
SAMPLE
PORT
CONTINUOUS
MONITOR
LOCATION
64 in.
123 in.

Figure 4-2. Scrubber outlet sampling locations.

POINT NO.	DISTANCE FROM STACK WALL, in.
1,9	6.4
2,8	19.2
0	32
3,7	44.8
4,6	57.6



OUTLET


CEM PROBE
8.5 in.
17 in.
17 in.
8.5 in.
16
13
10
4
1
17
14
11
5
2
18
15
12
6
3
51 in.
91 in.
15 in.
7.5 in.

INLET

(POINTS 7-9 COULD NOT BE TRAVERSED BECAUSE CEM PROBE OCCUPIED THIS PORT)

Figure 4-3. Location of sampling points for stratification check.

TABLE 4-3. INLET AND OUTLET STRATIFICATION TESTS

Inlet			Outlet		
Point	Avg. SO_2, ppm	Avg. O_2, %	Point	Avg. SO_2, ppm	Avg. O_2, %
1	136	16.4	1	45.5	16.2
2	250	16.2	2	51	16.3
3	374	16.4	Center	53	16.2
4	486	16.3	3	52	16.4
5	569	15.8	4	53.5	16.5
6	607	16.0	5	69	16.4
7	a	a	6	65.5	16.2
8	a	a	Center	65.5	16.3
9	a	a	7	63	16.1
10	581	16.0	8	64	16.1
11	602	16.1			
12	583	16.2			
13	610	16.2			
14	569	16.5			
15	543	16.6			
16	574	16.4			
17	595	16.5			
18	610	16.5			

[a] Points 7 to 9 could not be traversed because CEM probe occupied port.

commercial SO_2/N_2 gases used for daily calibration were referenced to the certified gases by alternate injection into the SO_2 analyzer. The average of three such runs was used for the calibration gas value.

The oxygen calibration gases were analyzed in triplicate by using an Orsat apparatus. Table 4-4 shows the results of these comparisons. The actual test data are included in Appendix B.

Calibration Error

Calibration error tests for the SO_2 outlet were performed on April 4, and those for the SO_2 inlet and the O_2 monitor were performed on April 5. The SO_2 monitor met the error limitation of less than 5 percent on both operating ranges, and the O_2 monitor met the same limitation on its single range. Tables 4-5 and 4-6 present the test results for the low- and high-range (outlet and inlet) SO_2 monitor calibration error, and Table 4-7 presents the results for O_2 monitor calibration error.

2-Hour Zero and Calibration Drift

The 2-hour drift tests of the SO_2 and O_2 monitors were performed April 3 through April 8. Tables 4-8 and 4-9 present the results of the low- and high-range (outlet and inlet) SO_2 monitor drift tests, which were within the allowable limit of 2 percent of span for both zero and calibration drift. Table 4-10 presents the O_2 monitor drift test results, which were within the allowable limit of 0.4 percent O_2 for zero and calibration drift.

24-Hour Zero and Calibration Drift

The 24-hour drift tests were performed from April 3 through April 10. Tables 4-11 and 4-12 present results of the low- and high-range SO_2 monitor 24-hour drift tests; the data show compliance with the 2 and 2.5 percent limits for SO_2 monitor zero and calibration drift. Table 4-13 presents results of the O_2 monitor 24-hour zero and calibration drift tests; the data

TABLE 4-4. CALIBRATION GAS DATA

Certified SO_2/N_2 gases

Cylinder number	SO_2 concentration, ppm
EPA FF6706	4563
EPA FF6440	2423
EPA AAL6071	433
EPA FF5359	156
EPA LL1011	105
EPA LL10403	50.7

Commercial SO_2/N_2 calibration gases

Cylinder number	Average referenced value, ppm	Manufacturers tag value, ppm
SGAL 2230	3485	3399
SGAL 2291	1671	1592
SGAL 2328	428	427
SGAL 2293	248	249

Oxygen (O_2/N_2) calibration gases

Cylinder number	Average oxygen (by ORSAT analysis), %	Manufacturers tag value, %
72831	16.6	16.8
N33878	12.0	12.0

TABLE 4-5. TEST RESULTS FOR LOW-RANGE SO_2 MONITOR CALIBRATION ERROR (ppm SO_2)

Test No.	Calibration gas concentration (A)	Monitor reading (B)	Arithmetic difference [(A-B) + zero reading] Mid	Span
1	Zero	0.5		
2	249	248.6	0.9	
3	427	427.9		-0.4
4	Zero	2.0		
5	427	427.2		1.8
6	249	249.9	1.1	
7	Zero	0.6		
8	427	427		0.6
9	Zero	0.4		
10	249	246	3.4	
11	427	427.9		-0.5
12	249	248.1	1.3	
13	Zero	0.0		
14	249	247.5	1.5	
15	427	434		-7
		Arithmetic mean (AM)	1.64	-1.10
		95% confidence interval	2.47	4.57
		Calibration error,[a] %	0.96	1.32

[a] Calibration error = $\frac{|AM| + CI_{95}}{A} \times 100$

Where: A = span gas value.

TABLE 4-6. TEST RESULTS FOR HIGH-RANGE SO_2 MONITOR CALIBRATION ERROR
(ppm SO_2)

Test No.	Calibration gas concentration (A)	Monitor reading (B)	Arithmetic difference [(A-B) + zero reading]	
			Mid	Span
1	Zero	3.0		
2	1671	1675	-1	
3	3485	3481.5		6.5
4	Zero	1.0		
5	1671	1684.4	-12.4	
6	3485	3479.5		6.5
7	Zero	6.2		
8	1671	1687.6	-10.4	
9	3485	3487.9		3.3
10	Zero	6.6		
11	3485	3490		1.6
12	1671	1694.0	-16.4	
13	Zero	0		
14	1671	1693	-22	
15	3485	3515.5		-30.5
		Arithmetic mean (AM)	-12.44	-2.52
		95% confidence interval	9.66	19.59
		Calibration error,[a] %	0.634	0.63

[a] Calibration error = $\frac{|AM| + CI_{95}}{A} \times 100$

Where A = span gas value.

TABLE 4-7. TEST RESULTS FOR O_2 MONITOR CALIBRATION ERROR (% O_2)

Test No.	Calibration gas concentration (A)	Monitor reading (B)	Arithmetic difference (A-B) + (zero reading[a] - 12.0) Mid	Span
1	20.9	21.0		0.0
2	16.8	17.0	-0.1	
3	12.0	12.1 (+0.1)		
4	20.9	20.9		0.0
5	12.0	12.0		
6	16.8	16.8	0.0	
7	12.0	11.9 (-0.1)		
8	16.8	16.7	0.0	
9	20.9	20.9		-0.1
10	16.8	16.7	0.0	
11	20.9	20.9		-0.1
12	12.0	11.9 (-0.1)		
13	12.0	11.8 (-0.2)		
14	20.9	20.8		-0.1
15	16.8	16.8	-0.2	
		Arithmetic mean (AM)	-0.06	-0.06
		95% confidence interval	0.11	0.07
		Calibration error,[b] %	1.91	1.46

[a] O_2 analyzer range from 12% to 20.9% O_2. Low calibration gas concentration (12% O_2) treated as zero.

[b] Calibration error = $\frac{|AM| + CI_{95}}{(A - 12.0)} \times 100$

Where A = 20.9%.

TABLE 4-8. TEST RESULTS FOR LOW-RANGE OUTLET SO_2 MONITOR 2-HOUR ZERO AND CALIBRATION DRIFT[a]
(ppm except as indicated)

Test No.	Date	Test time		Zero reading		Zero drift (C=B-A)	Span reading		Span drift (F=E-D)	Calibration drift (F-C)
		Start	End	Start (A)	End (B)		Start (D)	End (E)		
1	4/3	15:32	17:02	0.1	-0.6	-0.7	421	433	12	12.7
2	4/4	11:00	13:00	-8.3	-3.0	5.3	422	423	1	-4.3
3	4/4	13:00	15:15	-3.0	0.5	3.5	423	428	5	1.5
4	4/4	16:00	18:22	0.5	1.2	0.7	428	430	2	1.3
5	4/4	18:22	20:26	1.2	2.3	1.1	430	426	-4	-5.1
6	4/5	11:00	13:20	0.9	0.5	-0.4	426	428	2	2.4
7	4/5	14:45	16:34	0.9	1.6	0.7	428	430	2	1.3
8	4/6	9:00	11:16	5.2	3.5	-1.7	432.9	432	-0.9	0.8
9	4/6	11:16	13:00	3.5	4.0	0.5	432	434.5	2.5	2.0
10	4/6	13:00	15:33	4.0	2.5	-1.5	434.5	435	0.5	2.0
11	4/7	11:00	13:50	2.5	0.4	-2.1	435	428	-7	-4.9
12	4/7	13:50	15:57	0.4	0.6	0.2	428	429	1	0.8
13	4/8	9:10	11:19	-0.4	1.4	1.8	431	435	4	2.2
14	4/8	11:19	12:47	1.4	1.2	-0.2	435	433	-2	-1.8
15	4/8	12:47	15:00	1.2	0.7	-0.5	433	430	-3	-2.5
Arithmetic mean (AM)						0.447				0.56
95% confidence interval						1.08				2.39
2-hour drift,[b] %						0.36				0.69

[a] Calibration gas concentration of 427 ppm SO_2 and scale from 0 to 500 ppm SO_2.

[b] $\% \text{ drift} = \frac{|AM| + CI_{95}}{427} \times 100$

TABLE 4-9. TEST RESULTS FOR HIGH-RANGE INLET SO_2 MONITOR 2-HOUR ZERO AND CALIBRATION DRIFT[a]

(ppm except as indicated)

Test No.	Date	Test time		Zero reading		Zero drift	Span reading		Span drift	Calibration drift
		Start	End	Start (A)	End (B)	(C=B-A)	Start (D)	End (E)	(F=E-D)	(F-C)
1	4/4	11:00	13:08	5	8	3	3466	3457	-9	-12
2	4/4	13:18	15:15	8	-0.5	-8.5	3457	3498	41	49.5
3	4/4	16:10	18:22	-0.5	7.0	7.5	3498	3485	-13	-20.5
4	4/4	18:22	20:26	7.0	5.4	-1.6	3485	3493	8	9.6
5	4/5	11:00	13:20	-0.5	3.0	3.5	3481	3482	1	-2.5
6	4/5	14:45	16:34	3.0	12.5	9.5	3482	3487	5	-4.5
7	4/6	9:00	11:16	11.0	11.0	0.0	3443	3468.5	25.5	25.5
8	4/6	11:16	13:00	11.0	6.7	-4.3	3468.5	3475.7	7.2	11.5
9	4/6	13:00	15:33	6.7	10.5	3.8	3475.7	3508	32.3	28.5
10	4/7	11:00	13:50	9.0	9.1	0.1	3486	3503	17	16.9
11	4/7	13:50	15:57	9.1	4.0	-5.1	3503	3497	-6	-0.9
12	4/8	9:10	11:19	6.6	10	3.4	3501	3526	25	21.6
13	4/8	11:19	12:47	10.0	2.5	-7.5	3526	3520	-6	1.5
14	4/8	12:47	15:00	2.5	5.8	3.3	3520	3504	-16	-19.3
15	4/3	15:32	17:02	1.0	5	4.0	3440	3444	+4	0.0
Arithmetic mean (AM)						0.74				6.99
95% confidence interval						2.92				10.59
2-hour drift,[b] %						0.11				0.50

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[a] Calibration gas concentration of 3485 ppm SO_2 and scale from 0 to 5000 ppm SO_2.

[b] $\% \text{ drift} = \frac{|AM| + CI_{95}}{3485} \times 100$

TABLE 4-10. TEST RESULTS FOR O_2 MONITOR 2-HOUR ZERO AND CALIBRATION DRIFT[a]

($\% O_2$ except as indicated)

Test No.	Date	Test time		Low reading		Low drift	Span reading		Span drift	Calibration drift
		Start	End	Start (A)	End (B)	(C=B-A)	Start (D)	End (E)	(F=E-D)	(G=F-C)
1	4/3	15:30	17:02	12.1	11.8	-0.3	20.9	21.1	0.2	0.5
2	4/4	11:00	13:00	12	12.1	0.1	21.1	21.0	-0.1	-0.2
3	4/4	13:00	15:15	12.1	12.2	0.1	21.0	20.8	-0.2	-0.3
4	4/4	16:10	18:22	12.2	11.9	-0.3	20.8	20.9	0.1	0.4
5	4/4	18:22	20:26	11.9	12.2	0.3	20.9	21.0	0.1	-0.2
6	4/5	11:00	13:00	11.9	12.3	0.4	21.1	21.2	0.1	-0.3
7	4/5	13:00	14:45	12.0	12.2	0.2	20.9	21.1	0.2	0.0
8	4/6	9:00	11:16	12.1	12.1	0.0	21.0	21.0	0.0	0.0
9	4/6	11:16	13:00	12.1	12.1	0.0	21.0	20.9	-0.1	-0.1
10	4/6	13:00	15:33	12.1	12.1	0.0	20.9	20.9	0.0	0.0
11	4/7	11:00	13:50	12.1	12.0	-0.1	21.0	20.8	-0.2	-0.1
12	4/7	13:50	15:57	12.0	11.9	-0.1	20.8	20.8	0.0	0.1
13	4/8	9:10	11:19	12.1	12.2	0.1	21.0	20.9	-0.1	-0.2
14	4/8	11:19	12:47	12.2	12.0	-0.2	20.9	21.0	0.1	0.3
15	4/8	12:47	15:00	12.0	12.2	0.2	21.0	21.0	0.0	-0.2
		Arithmetic mean (AM)				0.027				-0.02
		95% confidence interval				0.114				0.138
		2-hour drift,[b] %				1.584				1.775

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[a] O_2 analyzer range from 12% O_2 to 20.9% O_2. Low calibration gas concentration (12% O_2) treated as zero.

[b] $$\% \text{ drift} = \frac{|AM| + CI_{95}}{(20.9 - 12.0)} \times 100$$

TABLE 4-11. TEST RESULTS FOR LOW-RANGE OUTLET SO_2 MONITOR 24-HOUR ZERO AND CALIBRATION DRIFT (ppm SO_2 except as indicated)

Test No.	Date (1981)		Test time		Zero reading		Zero drift (C=B-A)	Span reading		Span drift (F=E-D)	Calibration drift (F-C)
	Start	End	Start	End	Start (A)	End (B)		Start (D)	End (E)		
1	4/3	4/4	12:52	13:00	1.1	-3.0	-4.4	429.7	423	-6.7	-2.3
2	4/4	4/5	13:00	13:20	-3.0	0.5	3.5	423	428	5	1.5
3	4/5	4/6	13:20	13:00	0.5	4.0	3.5	428	434.5	6.5	3.0
4	4/6	4/7	13:00	13:50	4.0	0.5	-3.5	434.5	428	-6.5	-3.0
5	4/7	4/8	13:50	12:47	0.5	1.2	0.7	428	433	5	4.3
6	4/8	4/9	12:47	14:04	1.2	-8.7	-9.9	433	430	-3	6.9
7	4/9	4/10	14:04	13:41	-8.7	0.0	+8.7	430	429.4	-0.6	-9.3
Arithmetic mean (AM)							-0.2				0.157
95% confidence interval (CI_{95})							5.726				5.04
24-hour drift,[a] %							1.39				1.22

[a] $\% \text{ 24-hour drift} = \frac{|AM| + CI_{95}}{427} \times 100$

TABLE 4-12. TEST RESULTS FOR HIGH-RANGE INLET SO_2 MONITOR 24-HOUR ZERO AND CALIBRATION DRIFT
(ppm SO_2 except as indicated)

Test No.	Date (1981)		Test time		Zero reading		Zero drift (C=B-A)	Span reading		Span drift (F=E-D)	Calibration drift (F-C)
	Start	End	Start	End	Start (A)	End (B)		Start (D)	End (E)		
1	4/3	4/4	12:52	13:18	-0.5	8	8.5	3449	3457	6	-2.5
2	4/4	4/5	13:18	13:20	8	3.0	-5	3457	3482	25	30
3	4/5	4/6	13:20	13:00	3.0	6.7	3.7	3482	3475.7	-6.3	-10
4	4/6	4/7	13:00	13:52	6.7	9.1	2.4	3475.7	3503	27.3	24.9
5	4/7	4/8	13:50	12:47	9.1	2.5	-6.6	3503	3520	17	23.6
6	4/8	4/9	12:47	14:07	2.5	5.7	3.2	3520	3530	10	6.8
7	4/9	4/10	14:04	13:41	5.7	16.0	10.3	3530	3564	34	23.7
Arithmetic mean (AM)							2.36				13.785
95% confidence interval (CI_{95})							5.8				14.43
24-hour drift,[a] %							0.234				0.234

[a] % 24-hour drift = $\frac{|AM| + CI_{95}}{3485} \times 100$

TABLE 4-13. 24-HOUR ZERO AND CALIBRATION DRIFT[a]
(% O_2 except as indicated)

Test No.	Date (1981)		Test time		Low reading		Low drift (C=B-A)	Span reading		Span drift (F=E-D)	Calibration drift (F-C)
	Start	End	Start	End	Start (A)	End (B)		Start (D)	End (E)		
1	4/3	4/4	12:50	13:18	12.1	12.1	0	21	21	0	0
2	4/4	4/5	13:18	13:20	12.1	12.3	0.2	21	21.2	0.2	0
3	4/5	4/6	13:20	13:00	12.0	12.1	-0.1	20.9	20.9	0	-0.1
4	4/6	4/7	13:00	13:50	12.1	12.0	-0.1	20.9	20.9	0	0.1
5	4/7	4/8	13:50	12:47	12.0	12.0	0	20.8	21.0	0.2	0.2
6	4/8	4/9	12:47	14:04	12.0	11.7	-0.3	21.0	20.5	-0.5	-0.2
7	4/9	4/10	14:04	13:41	12.0	12.2	0.2	20.9	20.9	0	-0.2
Arithmetic mean (AM)							-0.014				0.029
95% confidence interval (CI_{95})							0.16				0.138
Low drift, %[b]							1.95	Calibration drift			1.876

[a] O_2 analyzer range from 12% to 20.9 % O_2. Low calibration gas concentration (12% O_2) treated as zero.

[b] $\% \text{ low drift} = \frac{|AM| + CI_{95}}{20.9 - 12.0} \times 100$

show compliance with the 0.5 percent limit for O_2 monitor zero and calibration drift.

CEM Response Time

Previous testing has shown the instrument and system response times for DuPont 460 and Thermox WDG III gas monitors to be well within the 15-minute specification. This was verified by tests performed April 6, which showed the average response time in all cases to be less than 3 minutes. Tables 4-14 and 4-15 present results of the low- and high-range (outlet and inlet) SO_2 and O_2 monitor tests. Tables 4-16 and 4-17 show test results for the O_2 monitor.

System's Relative Accuracy

The initial tests of the system's relative accuracy (Tables 4-18 and 4-19) were performed on March 4 and 5. Results showed relative accuracy of 1.72 percent for ppm and 8.0 percent for mass per gross calorific value (M/GCV) for the inlet and 18.7 percent for ppm and 16.4 percent M/GCV for the outlet, which were in compliance with the specified limit of 20 percent or 10 percent of the applicable standard. The final relative accuracy tests (Tables 4-20 and 4-21) were performed April 7, 8, and 9. Comparison with the initial relative accuracy test indicated the performance of the CEM system had deteriorated slightly. This was due in part to the significantly lower average loading on the system (445 ppm vs. 773 ppm on the inlet and 19.6 ppm vs. 29.5 ppm at the outlet). The relative accuracy of the inlet channel was 12.9 percent for SO_2 ppm and 12.7 percent for SO_2 on the mass per heat value basis.

The outlet data showed relative accuracy of 49.2 percent ppm and 39.5 percent M/GCV up from the initial values of 18.7 and 16.4 percent. The

TABLE 4-14. TEST RESULTS FOR OUTLET SO_2 MONITOR RESPONSE TIME[a] (seconds)

Test No.	Upscale	Downscale
1	100	165
2	96	170
3	99	156
Average	98	164

System response time (slower of A and B) = 164 seconds

[a] Tested April 6 by using a span gas of 456 ppm SO_2.

TABLE 4-15. TEST RESULTS FOR INLET SO_2 MONITOR RESPONSE TIME[a] (seconds)

Test No.	Upscale	Downscale
1	75	165
2	77	150
3	81	168
Average	78	161

System response time (slower of A and B) = 161 seconds

[a] Tested April 6 by using a span gas of 3240 ppm SO_2.

TABLE 4-16. TEST RESULTS FOR INLET O_2 MONITOR RESPONSE TIME[a]
(seconds)

Test No.	Upscale	Downscale
1	120	45
2	115	65
3	140	72
Average	125	61

System response time (slower of A and B) = 125 seconds

[a] Tested April 6 by using ambient air.

TABLE 4-17. TEST RESULTS FOR OUTLET OXYGEN MONITOR RESPONSE TIME[a]
(seconds)

Test No.	Upscale	Downscale
1	140	90
2	125	116
3	156	119
Average	140	108

System response time (slower of A and B) = 140 seconds

[a] Tested April 6 by using ambient air.

TABLE 4-18. RESULTS OF MARCH 4 INLET RELATIVE ACCURACY TESTS

Test No.	Method 6		Analyzer 1-hour average SO_2		Difference (X_i)		X_i^2	
	ppm	$lb/10^6$ Btu	ppm	$lb/10^6$ Btu	ppm	$lb/10^6$ Btu	ppm	$lb/10^6$ Btu
RIC-1	775	4.57	753	4.49	22	0.08	484	0.0064
RIC-3	802	4.30	805	4.72	-3	-0.42	9	0.1764
RIC-4	734	4.28	736	4.39	-2	-0.11	4	0.0121
RIC-5	671	4.26	668	3.98	3	0.28	9	0.0784
RIC-6	766	4.10	793	4.36	-27	-0.26	729	0.0676
RIC-7	753	4.04	768	4.36	-15	-0.32	225	0.1024
RIC-8	693	4.03	694	4.36	-1	-0.33	1	0.1089
RIC-9	697	4.03	689	4.18	8	0.15	64	0.0225
RIC-10	703	4.13	707	4.01	-4	-0.12	16	0.0144
Σ	6594	37.71			-19	-1.05	1541	0.5891
	Average reference method (RM) values				Mean difference $\lvert\bar{X}\rvert$			
	733	4.19			2.11	0.12		

Calculations:

$$|\bar{x}| = \frac{1}{n} \sum_{i=1}^{n} X_i$$

$$C.I._{95} = \frac{t_{0.975}}{n\sqrt{(n-1)}} \sqrt{n(\Sigma X_i^2)-(\Sigma X_i)^2}$$

$$\left| \frac{|\bar{X}| + C.I._{95}}{\text{Average reference method}} \right| \times 100 = \text{\% relative accuracy}$$

95% confidence interval = 10.5 ppm SO_2
System relative accuracy = 1.72% of RM
95% confidence interval = 0.186 lb $SO_2/10^6$ Btu
System relative accuracy = 7.3% of RM

TABLE 4-19. RESULTS OF MARCH 5 OUTLET RELATIVE ACCURACY TESTS

Test No.	Method 6		Analyzer 1-hour average SO_2		Difference (X_i)		X_i^2	
	ppm	lb/10^6 Btu	ppm	lb/10^6 Btu	ppm	lb/10^6 Btu	ppm	lb/10^6 Btu
ROC-1	27.4	0.147	26.6	0.132	0.8	0.015	0.64	0.0002
ROC-5	23.2	0.122	29.2	0.143	-6	-0.021	36	0.0004
ROC-6	32.8	0.158	33.1	0.156	-0.3	0.002	0.09	0.000004
ROC-7	29.2	0.150	35.3	0.195	-6.1	-0.045	37.2	0.002
ROC-8	25.6	0.129	34.1	0.150	-8.5	-0.021	72.3	0.0004
ROC-9	24.0	0.133	20.1	0.103	3.9	0.030	15.2	0.0009
ROC-10	33.6	0.188	36.3	0.166	-2.7	0.022	11	0.0005
ROC-11	36.2	0.192	34.6	0.190	1.6	0.002	2.6	0.000004
ROC-12	33.7	0.160	37.4	0.194	-3.7	-0.034	13.7	0.0012
Σ	265.7	1.379			-21	-0.048	188.7	0.0056
	Average reference method (RM) values				Mean difference $\|\bar{X}\|$			
	29.52	0.1532			2.3	0.0053		

Calculations:

$$|\bar{X}| = \frac{1}{n} \sum_{i=1}^{n} X_i$$

$$C.I._{95} = \frac{t_{0.975}}{n\sqrt{(n-1)}} \sqrt{n(\Sigma X_i^2) - (\Sigma X_i)^2}$$

$$\left| \frac{|\bar{X}| + C.I._{95}}{\text{Average reference method}} \right| \times 100 = \% \text{ relative accuracy}$$

95% confidence interval = 3.2 ppm SO_2
System relative accuracy = 18.67% of RM
95% confidence interval = 0.20 lb $SO_2/10^6$ Btu
System relative accuracy = 16.43% of RM

TABLE 4-20. RESULTS OF APRIL 7 INLET RELATIVE ACCURACY TESTS

Test No.	Method 6		Analyzer 1-hour average SO_2		Difference (X_i)		X_i^2	
	ppm	$lb/10^6$ Btu	ppm	$lb/10^6$ Btu	ppm	$lb/10^6$ Btu	ppm	$lb/10^6$ Btu
RIC-1	457	4.97	509	5.30	-52	-0.33	2704	0.1089
RIC-2	491	5.34	527	4.94	-36	0.40	1296	0.1600
RIC-3	512	5.22	538	4.70	-26	0.52	676	0.2704
RIC-4	392	3.98	494	4.67	-102	-0.69	10404	0.4761
RIC-5	459	4.97	485	4.72	-26	0.25	676	0.0625
RIC-6	441	4.77	466	4.53	-25	0.24	625	0.0576
RIC-7	413	4.22	439	4.98	-26	-0.76	676	0.5776
RIC-8	420	4.57	441	5.42	-21	-0.85	441	0.7225
RIC-9	420	4.88	440	5.35	-20	-0.47	400	0.2209
Σ	4005	42.92			-334	-1.69	17898	2.6565
	Average reference method (RM) values				Mean difference $\lvert\bar{X}\rvert$			
	445	4.77			37.1	0.19		

Calculations:

$$|\bar{X}| = \frac{1}{n}\sum_{i=1}^{n} X_i$$

$$C.I._{95} = \frac{t_{0.975}}{n\sqrt{(n-1)}}\sqrt{n(\Sigma X_i^2)-(\Sigma X_i)^2}$$

$$\left|\frac{|\bar{X}| + C.I._{95}}{\text{Average reference method}}\right| \times 100 = \%\ \text{relative accuracy}$$

95% confidence interval = 20.2 ppm SO_2
System relative accuracy = 12.86% of RM
95% confidence interval = 0.416 lb $SO_2/10^6$ Btu
System relative accuracy = 12.70% of RM

TABLE 4-21. RESULTS OF APRIL 8 AND 9 OUTLET RELATIVE ACCURACY TESTS

Test No.	Method 6		Analyzer 1-hour average SO_2		Difference (X_i)		X_i^2	
	ppm	$lb/10^6$ Btu	ppm	$lb/10^6$ Btu	ppm	$lb/10^6$ Btu	ppm	$lb/10^6$ Btu
ROC-1	17.9	0.153	21	0.25	-3.1	-0.097	9.61	0.0094
ROC-3	10.3	0.120	10	0.12	0.3	0.00	0.09	0.0
ROC-4	12.1	0.124	8	0.09	4.1	0.034	16.81	0.0012
ROC-5	11.2	0.115	6	0.08	5.2	0.035	27.04	0.0012
ROC-6	13.5	0.146	7	0.08	6.5	0.066	42.25	0.0044
ROC-7	14.7	0.149	7	0.08	7.7	0.069	59.29	0.0048
ROC-8	24.6	0.249	15	0.16	9.6	0.089	92.16	0.0079
ROC-11	47.3	0.485	31	0.38	16.3	0.105	265.69	0.0110
ROC-13	24.8	0.271	25.3	0.29	-0.5	0.019	0.25	0.0004
Σ	176.4	1.812			46.1	0.282	513.19	0.0403
	Average reference method (RM) values				Mean difference $\lvert \bar{X} \rvert$			
	19.6	0.201			5.12	0.0313		

Calculations:

$$\lvert \bar{X} \rvert = \frac{1}{n} \sum_{i=1}^{n} X_i$$

$$C.I._{95} = \frac{t_{0.975}}{n\sqrt{(n-1)}} \sqrt{n(\Sigma X_i^2)-(\Sigma X_i)^2}$$

$$\left| \frac{\lvert \bar{X} \rvert + C.I._{95}}{\text{Average reference method}} \right| \times 100 = \text{\% relative accuracy}$$

95% confidence interval = 4.52 ppm SO_2
System relative accuracy = 49.2% of RM
95% confidence interval = 0.0482 lb $SO_2/10^6$ Btu
System relative accuracy = 39.55% of RM

relative accuracy of the outlet is still acceptable because the net uncertainty in the emission rate is less than 10 percent of the NSPS standard (1.2 lb/10^6 Btu).

Performance Testing for the Oxygen Monitor

The Thermox WDG-P oxygen analyzer used during this test program produced a logarithmic voltage response to the concentration of oxygen in the sample stream. On this response curve, ambient concentrations (20.9 percent O_2) corresponded to zero millivolts and nitrogen (0 percent O_2) corresponded to 4500 millivolts. This gave very high resolution to O_2 concentrations below 1 percent and limited accuracy in the 12 to 21 percent O_2 range. Past experience at this facility has shown that most O_2 concentrations fall in the high range because of dilution air. For the purpose of improving data quality and meeting the Performance Specification Test requirements for precision of data recording, an amplifier that increased the resolution in the high O_2 concentration range was installed.

With the approval of EPA's Emissions Measurement Branch (EMB), the O_2 analyzer was treated as a limited-range device. A lower limit of 12 percent O_2 was chosen with ambient air as the span value. Comparison with the normal 20.9 percent range showed that the use of this reduced range required an increase in accuracy. This can be demonstrated by the midrange calibration error calculation shown by using the reduced range (16.8 - 12.0 = 4.8) versus the normal range.

$$\%\ \text{error} = \frac{CI + \bar{X}}{A} \times 100$$

$$\text{Reduced value} \quad \frac{0.041 + 0.06}{4.8} \times 100 = 2.11$$

$$\text{Tag value} \quad \frac{0.04 + 0.06}{16.8} \times 100 = 0.65$$

Oxygen levels did not drop below 14 percent during the entire test period. This limited range assumption was therefore suitable for the performance measurements of the Thermox analyzer in the operational range.

QUALITY ASSURANCE PROCEDURES

A quality assurance program was established at the outset of the test period to provide independent checks of monitor performance on a weekly basis. This program began with the use of certified EPA SO_2/N_2 cylinder gases to set the calibration curve of the monitoring system. All other calibration gas values were referenced to the EPA cylinders.

System Audits

During the relative accuracy tests of the system (March 4-6), an independent audit team from Research Triangle Institute performed a qualitative evaluation of sample location, CEM calibration procedures, and reference method sampling technique. On March 6 this RTI audit team conducted performance audits by challenging the CEM system with known gas concentrations. The manual sampling performance audit included field calibration of the dry gas meter and analysis of U.S. EPA Quality Assurance samples. The audit results were satisfactory in all categories.

On March 13 a PEDCo audit team again challenged the CEM system. This audit was conducted in the same manner as the RTI audit, which was to introduce a gas at the probe at the measured static pressure of the duct. The flow rate of the gas was maintained at the normal sampling flow rate. This audit was also satisfactory.

The next quality assurance measure was to run a battery of four inlet and four outlet Reference Method 6 checks on March 20 and 21. These checks detected a leak in the inlet sample select valve. Further PEDCo audits were conducted on March 26 and additional Method 6 tests were conducted on March 30 to quantify the leak.

The final system audit took place on April 6. The results were again satisfactory. A second relative accuracy test of the system was conducted on April 7-9. Although this test showed a slight decline in performance, the CEM system relative accuracy was within specified limits.

Leak Calculations for Sample Select Valve

A leak developed in the inlet sample select valve during the third week of testing. This section describes the procedure used to determine what effect this leak had on the data. During the week of March 22, an unexplained loss of scrubber efficiency suggested a deficiency in the CEM system. When the results of the March 20 Reference Method 6 tests became available, they showed the outlet CEM readings averaged 40 to 60 ppm higher than the Reference Method 6 value. On March 25 the CEM operator demonstrated the leak by alternately connecting and disconnecting the inlet sample line while the analyzer was sampling the outlet. Significant changes in the outlet response were observed. The inlet gas stream, under 23.5 in. H_2O pressure from the forced-draft fan, was apparently leaking past the seal on the inlet sample select valve. (The sample select valves are paired four-way valves that switch automatically, on a 10-minute cycle, to permit inlet and outlet gas streams to be analyzed by the single sample cell.) To determine the extent of the leak, the inlet probe was disconnected and the static pressure was measured with a manometer. The outlet channel was zeroed with nitrogen. Then, while the outlet was sampling N_2, a known concentration of SO_2 was introduced to the closed inlet valve at the observed pressure. The leak rate was then calculated as shown below.

$$SI(x) + SO(1-x) = SO^*$$

where SI = known inlet concentration

SO = known outlet concentration (in the above case, zero)

x = percent inlet gas leaking into sample stream

SO* = observed outlet concentration including inlet leak

This equation simplifies to

$$\frac{SO^*-SO}{SI-SO} \times 100 = x \text{ (percent leakage from inlet stream)}$$

This procedure was repeated three times with different SO_2 concentrations. Each test showed a leak rate of approximately 4 percent. A similar test was run on the outlet valve, but it produced no evidence of leakage. On March 26, a PEDCo audit team conducted a similar series of tests in which gases were introduced at the probes.

On March 30 additional Reference Method tests were run. A total of four Reference Method 6 tests were conducted on the outlet to quantify the leak. The results from all of the above tests were assembled, and a statistical regression was conducted at a 95 percent confidence interval (see Table 4-22).

Calculations, which are presented in Table 4-22, showed an average leak rate of 4.3 ± 0.7 percent. This correction factor was applied to all outlet data collected between March 20 and April 3, when the replacement valve was installed. In addition to the 10 tests mentioned above, a routine check was conducted at least once a day to ensure that the leak rate remained stable. This test consisted of measuring the incremental change in the outlet stack readings after the inlet sample line had been disconnected. The outlet reading (with and without the leak) and the current inlet stack reading were used to calculate the leak rate. Table 4-23 lists these daily checks.

TABLE 4-22. CALCULATION OF AVERAGE LEAK RATE

Method of measurement	Average leak rate A	$(\bar{A}-A)$	$(\bar{A}-A)^2$
CEM response	3.30	0.96	0.927
CEM response	3.38	0.88	0.775
CEM response	3.36	0.90	0.815
PEDCo audit	3.95	0.31	0.0980
PEDCo audit	5.86	-1.6	2.55
PEDCo audit	5.31	-1.05	1.1
M-6 test	4.10	0.16	0.0266
M-6 test	3.14	1.22	1.26
M-6 test	4.55	-0.29	0.0824
M-6 test	5.68	-1.42	2.01
Σ	42.60	$\Sigma(\bar{A}-A)^2$	9.64
Average leak rate $\bar{A}$	4.26	$S = \sqrt{\Sigma(\bar{A}-A)^2} / \sqrt{n-1} = 1.04$	

Calculations:

95% confidence interval $\bar{A} \pm \frac{ts}{n}$ $t_{95} = 2.26$

Average leak rate 4.26 ± 0.74

TABLE 4-23. DAILY LEAK RATE DETERMINATIONS

Date (1981)	Inlet, ppm SO_2	Actual outlet, ppm SO_2	Outlet with leak, ppm SO_2	Apparent leak rate, %
3/27	738	55.4	83.4	4.1
3/28	638	19	52	5.3
3/29	707	56	93	5.7
3/30	500	15	43	5.8
4/2	428	19	37	4.4
4/3	505	20	39	3.9

Error Band for Percent SO_2 Removal

Each channel of the CEM system met or exceeded all requirements for data precision and accuracy. The most critical parameter in this test series, however, is the percent of SO_2 removal (also called the scrubber efficiency), which is calculated as the percent difference between the scrubber inlet and outlet SO_2 mass emission rates. As a means of providing a better idea of the accuracy of the reported data, the initial and final relative accuracy results were used to predict the limits of uncertainty for the scrubber efficiency. The maximum deviation will occur when the maximum positive inlet deviation is evaluated against the minimum negative outlet deviation and vice versa. An error band of approximately ± 2.0 percent SO_2 removal was calculated.

REFERENCES FOR SECTION 4

1. Environmental Protection Agency. Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020, March 1979.

2. Standard Methods for the Examination of Water and Wastewater. 14th Edition. 1975.

3. Bechtel National, Inc. Laboratory Procedures Manual for the Shawnee Test Facility. April 1980.

4. American Society for Testing Materials. ASTM Standards, Part 26, Gaseous Fuels; Coal and Coke; Atmospheric Analysis. 1980.

APPENDIX A

HOURLY AND TEN-MINUTE AVERAGE EMISSION DATA

Daily Summary and Hourly Averages
March 4, 1981

Process Conditions

Average Boiler Load .... 99 mmBtu
Slurry pH 4.74
Adipic Acid concentration .... 2305 ppm

Scrubber Performance

	SO2 Inlet		SO2 Outlet		Eff
Time	#/mmBtu	ng/J	#/mmBtu	ng/J	%
00:00	3.81	1638.2	0.31	133.0	91.9
01:00	4.12	1771.5	0.53	225.9	87.2
02:00	3.95	1699.4	0.56	239.1	85.9
03:00	3.99	1715.9	0.94	405.3	76.4
04:00	3.95	1699.0	1.18	508.8	70.1
05:00	3.88	1669.9	1.04	448.6	73.1
06:00	3.83	1648.3	0.93	400.1	75.7
07:00	4.00	1719.4	0.49	208.8	87.9
08:00	4.12	1772.7	0.20	85.8	95.2
09:00	4.72	2029.7	0.55	234.8	88.4
10:00	4.38	1883.9	0.21	91.9	95.1
11:00	4.42	1898.3	0.16	70.0	96.3
12:00	4.32	1858.4	0.13	57.0	96.9
13:00	4.17	1792.3	0.15	64.5	96.4
14:00	4.16	1787.0	0.15	62.9	96.5
15:00	4.12	1771.4	0.13	55.2	96.9
16:00	3.98	1712.0	0.12	50.2	97.1
17:00	3.84	1651.8	0.11	46.6	97.2
18:00	3.81	1636.6	0.12	49.5	97.0
19:00	3.77	1620.3	0.13	57.3	96.5
20:00	3.74	1607.6	0.13	56.2	96.5
21:00	3.82	1643.8	0.13	58.0	96.5
22:00	3.80	1635.5	0.13	57.0	96.5
23:00	3.62	1558.6	0.13	54.3	96.5
Mean	4.00	1719.9	0.30	127.3	92.6
Maximum	4.72	2029.7	1.18	508.8	97.2
Minimum	3.62	1558.6	0.11	46.6	70.1
Std dev	0.26	110.3	0.35	148.8	8.8
% Std dev	6.4	6.4	116.9	116.9	9.5

Number of one-hour averages: 24
Percent coverage: 100.0

Daily Summary and Hourly Averages
March 5, 1981

Process Conditions

Average Boiler Load .... 123 mmBtu
Slurry pH 4.93
Adipic Acid concentration .... 2920 ppm

Scrubber Performance

Time	SO2 Inlet		SO2 Outlet		Eff
	#/mmBtu	ng/J	#/mmBtu	ng/J	%
00:00	3.60	1547.3	0.12	50.5	96.7
01:00	3.41	1468.1	0.10	45.0	96.9
02:00	3.38	1452.8	0.09	39.2	97.3
03:00	3.23	1387.8	0.09	37.5	97.3
04:00	3.25	1399.1	0.10	41.3	97.0
05:00	3.26	1402.0	0.10	43.5	96.9
06:00	3.16	1358.5	0.12	52.8	96.1
07:00	3.21	1378.4	0.14	58.8	95.7
08:00	***	****	***	****	***
09:00	***	****	***	****	***
10:00	2.13	915.6	0.15	63.0	93.1
11:00	***	****	***	****	***
12:00	***	****	***	****	***
13:00	3.75	1611.7	0.14	61.8	96.2
14:00	3.70	1591.7	0.16	68.8	95.7
15:00	2.45	1052.3	0.15	64.6	93.9
16:00	***	****	***	****	***
17:00	2.09	897.8	0.08	36.0	96.0
18:00	2.14	918.4	0.15	62.6	93.2
19:00	1.27	544.0	0.18	78.9	85.5
20:00	***	****	***	****	***
21:00	4.49	1931.5	0.09	40.6	97.9
22:00	3.55	1526.1	0.20	87.6	94.3
23:00	3.64	1565.1	0.25	107.8	93.1
Mean	3.10	1332.1	0.14	59.0	95.6
Maximum	4.49	1931.5	0.25	107.8	97.9
Minimum	1.27	544.0	0.08	36.0	85.5
Std dev	0.78	336.4	0.04	19.3	2.9
% Std dev	25.3	25.3	32.7	32.7	3.0

Number of one-hour averages: 18
Percent coverage: 75.0

Daily Summary and Hourly Averages
March 6, 1981

Process Conditions

Average Boiler Load .... 122 #/mmBtu
Slurry pH 4.71
Adipic Acid concentration ... 2090 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	SO2 Inlet ng/J	SO2 Outlet #/mmBtu	SO2 Outlet ng/J	Eff %
00:00	4.29	1846.6	0.22	93.3	94.9
01:00	4.74	2039.6	0.23	100.7	95.1
02:00	4.91	2109.2	0.28	121.7	94.2
03:00	4.89	2104.5	0.32	135.9	93.5
04:00	4.81	2069.3	0.28	120.2	94.2
05:00	4.73	2034.2	0.21	90.7	95.5
06:00	4.18	1795.4	0.16	70.9	96.0
07:00	4.95	2129.3	0.12	51.2	97.6
08:00	5.02	2160.1	0.26	111.2	94.9
09:00	***	****	***	****	***
10:00	***	****	***	****	***
11:00	4.17	1793.2	0.26	112.1	93.7
12:00	***	****	***	****	***
13:00	3.63	1559.5	0.22	93.3	94.0
14:00	3.71	1594.6	0.26	112.0	93.0
15:00	3.65	1567.6	0.22	95.8	93.9
16:00	3.61	1551.1	0.19	82.4	94.7
17:00	3.57	1536.8	0.22	93.6	93.9
18:00	3.72	1598.2	0.23	100.3	93.7
19:00	3.78	1624.5	0.24	103.4	93.6
20:00	3.85	1657.0	0.27	116.7	93.0
21:00	3.87	1664.1	0.29	126.3	92.4
22:00	3.82	1643.9	0.25	108.6	93.4
23:00	3.78	1626.6	0.20	87.3	94.6
Mean	4.11	1766.5	0.24	101.6	94.2
Maximum	5.02	2160.1	0.32	135.9	97.6
Minimum	3.57	1536.8	0.12	51.2	92.4
Std dev	0.54	232.5	0.05	19.4	1.2
% Std dev	13.2	13.2	19.1	19.1	1.2

Number of one-hour averages: 21
Percent coverage: 87.5

Daily Summary and Hourly Averages
March 7, 1981

Process Conditions

Average Boiler Load .... 127 mmBtu
Slurry pH 4.94
Adipic Acid concentration ... 2290 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	SO2 Inlet ng/J	SO2 Outlet #/mmBtu	SO2 Outlet ng/J	Eff %
00:00	3.61	1554.2	0.24	101.9	93.4
01:00	3.61	1552.4	0.26	110.8	92.9
02:00	3.61	1553.5	0.29	125.3	91.9
03:00	3.77	1622.7	0.28	121.4	92.5
04:00	3.88	1666.3	0.32	136.1	91.8
05:00	3.83	1646.0	0.39	168.7	89.7
06:00	3.78	1624.6	0.42	178.6	89.0
07:00	3.74	1606.4	0.38	164.2	89.8
08:00	3.73	1601.8	0.41	174.8	89.1
09:00	***	****	***	****	***
10:00	3.89	1670.6	0.35	152.2	90.9
11:00	4.01	1723.6	0.37	161.2	90.6
12:00	3.91	1679.1	0.37	159.4	90.5
13:00	4.02	1730.4	0.37	160.6	90.7
14:00	3.98	1710.0	0.34	144.6	91.5
15:00	3.90	1677.8	0.22	95.9	94.3
16:00	3.86	1660.8	0.20	86.2	94.8
17:00	3.80	1634.9	0.19	82.0	95.0
18:00	3.85	1654.7	0.20	88.1	94.7
19:00	3.79	1627.7	0.20	86.2	94.7
20:00	3.86	1661.6	0.22	94.6	94.3
21:00	3.99	1715.4	0.30	128.7	92.5
22:00	3.75	1610.8	0.22	96.3	94.0
23:00	3.70	1590.7	0.34	145.4	90.9
Mean	3.82	1643.2	0.30	129.0	92.1
Maximum	4.02	1730.4	0.42	178.6	95.0
Minimum	3.61	1552.4	0.19	82.0	89.0
Std dev	0.12	52.4	0.08	32.7	2.0
% Std dev	3.2	3.2	25.3	25.3	2.1

Number of one-hour averages: 23
Percent coverage: 95.8

Daily Summary and Hourly Averages
March 8, 1981

Process Conditions

Average Boiler Load .... 126 mmBtu
Slurry pH 5.00
Adipic Acid concentration ... 2150 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	SO2 Inlet ng/J	SO2 Outlet #/mmBtu	SO2 Outlet ng/J	Eff %
00:00	3.68	1580.2	0.42	179.0	88.7
01:00	3.77	1621.1	0.24	103.4	93.6
02:00	3.80	1634.2	0.56	239.5	85.3
03:00	3.81	1639.5	0.50	214.0	86.9
04:00	3.78	1625.5	0.60	257.9	84.1
05:00	***	****	***	****	***
06:00	***	****	***	****	***
07:00	***	****	***	****	***
08:00	***	****	***	****	***
09:00	***	****	***	****	***
10:00	3.85	1654.1	0.61	261.2	84.2
11:00	5.04	2168.6	0.38	164.4	92.4
12:00	4.51	1939.9	0.42	182.3	90.6
13:00	4.63	1991.7	0.37	157.2	92.1
14:00	4.34	1864.2	0.36	156.1	91.6
15:00	4.10	1764.8	0.27	117.2	93.4
16:00	4.16	1790.1	0.27	115.6	93.5
17:00	4.13	1775.3	0.24	101.3	94.3
18:00	4.14	1779.4	0.26	111.6	93.7
19:00	4.15	1784.9	0.25	108.3	93.9
20:00	4.19	1803.6	0.25	109.3	93.9
21:00	5.28	2269.7	0.42	180.3	92.1
22:00	4.33	1860.3	0.34	145.9	92.2
23:00	4.07	1751.8	0.30	127.3	92.7
Mean	4.16	1789.0	0.37	159.1	91.1
Maximum	5.28	2269.7	0.61	261.2	94.3
Minimum	3.68	1580.2	0.24	101.3	84.1
Std dev	0.43	184.9	0.12	52.5	3.4
% Std dev	10.3	10.3	33.0	33.0	3.8

Number of one-hour averages: 19
Percent coverage: 79.2

Daily Summary and Hourly Averages
March 9, 1981

Process Conditions

Average Boiler Load .... 119 mmBtu
Slurry pH 5.03
Adipic Acid concentration .... 1770 ppm

Scrubber Performance

	SO2 Inlet		SO2 Outlet		Eff
Time	#/mmBtu	ng/J	#/mmBtu	ng/J	%
00:00	4.01	1723.3	0.37	158.0	90.8
01:00	4.00	1717.8	0.36	155.8	90.9
02:00	3.81	1637.1	0.29	125.9	92.3
03:00	3.69	1587.2	0.26	112.2	92.9
04:00	3.48	1495.1	0.27	115.1	92.3
05:00	3.39	1459.5	0.24	104.4	92.8
06:00	3.37	1450.7	0.25	107.3	92.6
07:00	3.51	1509.0	0.25	106.0	93.0
08:00	3.33	1431.5	0.24	101.8	92.9
09:00	3.24	1391.8	0.24	101.5	92.7
10:00	6.13	2633.7	0.41	176.1	93.3
11:00	***	****	***	****	***
12:00	***	****	***	****	***
13:00	***	****	***	****	***
14:00	***	****	***	****	***
15:00	5.35	2299.8	0.35	149.0	93.5
16:00	4.28	1842.2	0.40	172.7	90.6
17:00	4.55	1954.2	0.24	103.3	94.7
18:00	4.82	2073.3	0.22	95.1	95.4
19:00	4.85	2086.4	0.26	112.1	94.6
20:00	4.11	1765.9	0.20	86.9	95.1
21:00	4.69	2015.6	0.18	77.7	96.1
22:00	4.76	2047.5	0.22	95.7	95.3
23:00	4.80	2064.7	0.20	84.9	95.9
Mean	4.17	1793.8	0.27	117.0	93.5
Maximum	6.13	2633.7	0.41	176.1	96.1
Minimum	3.24	1391.8	0.18	77.7	90.6
Std dev	0.78	333.4	0.07	29.4	1.7
% Std dev	18.6	18.6	25.1	25.1	1.8

Number of one-hour averages: 20
Percent coverage: 83.3

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              Daily Summary and Hourly Averages
                       March 10, 1981

     Process Conditions

              Average Boiler Load ......... 114   mmBtu
              Slurry pH ................... 4.98
              Adipic Acid concentration ... 2165 ppm


     Scrubber Performance

-------------------------------------------------------------------
                 SO2 Inlet             SO2 Outlet           Eff
    Time       #/mmBtu   ng/J       #/mmBtu    ng/J          %
-------------------------------------------------------------------
    00:00        4.72   2027.6        0.08      34.8        98.3
    01:00         ***     ****         ***      ****         ***
    02:00        5.30   2277.4        0.20      88.1        96.1
    03:00        5.62   2416.3        0.20      85.5        96.5
    04:00        5.82   2503.1        0.15      66.3        97.4
    05:00        6.08   2615.5        0.37     159.7        93.9
    06:00        6.11   2627.9        0.39     169.4        93.6
    07:00        5.23   2250.1        0.51     219.5        90.2
    08:00         ***     ****         ***      ****         ***
    09:00        5.28   2269.0        0.39     169.1        92.5
    10:00        5.25   2255.4        0.27     116.1        94.9
    11:00         ***     ****         ***      ****         ***
    12:00        3.82   1640.8        0.32     137.4        91.6
    13:00        4.58   1968.5        0.28     120.8        93.9
    14:00        4.57   1966.7        0.30     126.9        93.5
    15:00        4.49   1932.5        0.25     107.7        94.4
    16:00        4.45   1913.8        0.24     104.8        94.5
    17:00        4.39   1887.2        0.23      97.2        94.8
    18:00        4.31   1853.6        0.20      87.6        95.3
    19:00        4.38   1881.4        0.22      95.6        94.9
    20:00        4.24   1823.3        0.17      73.4        96.0
    21:00        3.41   1464.8        0.27     114.5        92.2
    22:00         ***     ****         ***      ****         ***
    23:00        4.43   1903.5        0.20      86.2        95.5

    Mean         4.88   2098.4        0.27     115.6        94.5
    Maximum      6.11   2627.9        0.51     219.5        98.3
    Minimum      3.41   1464.8        0.08      34.8        90.2
    Std dev      0.74    316.1        0.10      42.4         1.9
    % Std dev   15.1      15.1       36.7       36.7         2.0

    Number of one-hour averages: 20
    Percent coverage: 83.3
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Daily Summary and Hourly Averages
March 11, 1981

Process Conditions

Average Boiler Load .... 101 mmBtu
Slurry pH 4.84
Adipic Acid concentration .... 1890 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	SO2 Inlet ng/J	SO2 Outlet #/mmBtu	SO2 Outlet ng/J	Eff %
00:00	4.06	1746.8	0.20	85.9	95.1
01:00	4.16	1788.6	0.18	75.7	95.8
02:00	4.15	1784.4	0.15	64.3	96.4
03:00	4.27	1834.8	0.15	64.2	96.5
04:00	4.20	1806.7	0.15	64.7	96.4
05:00	4.16	1787.4	0.36	154.5	91.4
06:00	3.57	1535.2	0.10	42.2	97.3
07:00	4.47	1920.6	0.18	76.0	96.0
08:00	3.89	1674.3	0.18	76.1	95.5
09:00	***	****	***	****	***
10:00	***	****	***	****	***
11:00	***	****	***	****	***
12:00	4.93	2120.6	0.25	107.5	94.9
13:00	4.83	2077.9	0.25	105.3	94.9
14:00	***	****	***	****	***
15:00	3.61	1550.6	0.15	65.3	95.8
16:00	4.26	1831.2	0.15	64.7	96.5
17:00	4.57	1963.7	0.24	105.0	94.7
18:00	4.63	1992.8	0.24	102.4	94.9
19:00	4.69	2018.1	0.22	93.3	95.4
20:00	4.80	2064.8	0.28	121.2	94.1
21:00	4.74	2039.3	0.31	134.3	93.4
22:00	4.77	2050.0	0.22	95.4	95.3
23:00	***	****	***	****	***
Mean	4.37	1877.9	0.21	90.2	95.2
Maximum	4.93	2120.6	0.36	154.5	97.3
Minimum	3.57	1535.2	0.10	42.2	91.4
Std dev	0.41	174.6	0.07	28.1	1.3
% Std dev	9.3	9.3	31.1	31.1	1.4

Number of one-hour averages: 19
Percent coverage: 79.2

Daily Summary and Hourly Averages
March 12, 1981

Process Conditions

Average Boiler Load .... 100 mmBtu
Slurry pH 4.91
Adipic Acid concentration .... 1855 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	 ng/J	SO2 Outlet #/mmBtu	 ng/J	Eff %
00:00	4.75	2040.3	0.20	87.5	95.7
01:00	4.70	2021.8	0.22	94.2	95.3
02:00	4.73	2033.4	0.23	98.0	95.2
03:00	4.77	2050.1	0.25	107.2	94.8
04:00	4.68	2010.1	0.22	95.7	95.2
05:00	4.45	1913.7	0.21	89.4	95.3
06:00	4.16	1787.6	0.19	80.7	95.5
07:00	3.95	1700.2	0.15	66.4	96.1
08:00	***	****	***	****	***
09:00	4.22	1815.9	0.29	124.4	93.2
10:00	4.17	1791.7	0.33	140.3	92.2
11:00	4.21	1810.8	0.22	92.5	94.9
12:00	4.24	1824.5	0.23	99.9	94.5
13:00	4.12	1770.1	0.20	84.5	95.2
14:00	***	****	***	****	***
15:00	***	****	***	****	***
16:00	***	****	***	****	***
17:00	***	****	***	****	***
18:00	4.24	1824.7	0.15	63.2	96.5
19:00	4.69	2016.5	0.19	80.6	96.0
20:00	4.88	2096.3	0.18	79.5	96.2
21:00	4.75	2042.5	0.23	97.4	95.2
22:00	4.61	1982.8	0.24	103.6	94.8
23:00	***	****	***	****	***
Mean	4.45	1815.4	0.22	94.3	95.1
Maximum	4.88	2096.3	0.33	140.3	96.5
Minimum	3.95	1700.2	0.15	63.2	92.2
Std dev	0.29	125.6	0.04	18.5	1.1
% Std dev	6.6	6.6	19.6	19.6	1.1

Number of one-hour averages: 18
Percent coverage: 75.0

Daily Summary and Hourly Averages
March 14, 1981

Process Conditions

Average Boiler Load .... 98 mmBtu
Slurry pH 4.70
Adipic Acid concentration ... 1870 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	SO2 Inlet ng/J	SO2 Outlet #/mmBtu	SO2 Outlet ng/J	Eff %
00:00	***	****	***	****	***
01:00	***	****	***	****	***
02:00	***	****	***	****	***
03:00	4.49	1931.1	0.32	138.2	92.8
04:00	4.75	2040.4	0.34	146.3	92.8
05:00	5.58	2400.2	0.36	155.0	93.5
06:00	5.85	2516.4	0.39	167.9	93.3
07:00	6.09	2619.7	0.42	182.2	93.0
08:00	5.40	2321.8	0.39	168.5	92.7
09:00	***	****	***	****	***
10:00	***	****	***	****	***
11:00	5.18	2227.8	0.52	223.1	90.0
12:00	5.38	2311.4	0.56	238.8	89.7
13:00	5.57	2394.1	0.49	210.9	91.2
14:00	5.46	2347.3	0.39	167.1	92.9
15:00	***	****	***	****	***
16:00	7.57	3254.6	0.58	250.8	92.3
17:00	7.63	3279.6	0.56	241.2	92.6
18:00	7.83	3367.4	0.51	218.8	93.5
19:00	7.69	3306.2	0.52	222.4	93.3
20:00	7.73	3324.1	0.48	204.7	93.8
21:00	7.87	3385.4	0.51	217.6	93.6
22:00	7.92	3404.5	0.53	227.5	93.3
23:00	8.45	3632.2	0.48	207.2	94.3
Mean	6.19	2659.3	0.45	193.3	92.7
Maximum	8.45	3632.2	0.58	250.8	94.3
Minimum	4.49	1931.1	0.32	138.2	89.7
Std dev	1.35	580.1	0.08	35.3	1.2
% Std dev	21.8	21.8	18.3	18.3	1.3

Number of one-hour averages: 18
Percent coverage: 75.0

Daily Summary and Hourly Averages
March 15, 1981

Process Conditions

Average Boiler Load .... 93 mmBtu
Slurry pH 4.70
Adipic Acid concentration ... 2050 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	SO2 Inlet ng/J	SO2 Outlet #/mmBtu	SO2 Outlet ng/J	Eff %
00:00	***	****	***	****	***
01:00	8.36	3592.5	0.38	164.4	95.4
02:00	8.08	3473.2	0.42	179.9	94.8
03:00	8.24	3544.7	0.41	175.2	95.1
04:00	8.25	3545.4	0.39	167.0	95.3
05:00	8.21	3531.9	0.40	171.3	95.2
06:00	8.15	3503.4	0.41	177.6	94.9
07:00	8.11	3488.4	0.43	186.8	94.6
08:00	4.05	1739.2	0.24	105.2	93.9
09:00	7.80	3354.1	0.47	203.4	93.9
10:00	7.88	3389.2	0.37	161.2	95.2
11:00	7.70	3310.8	0.47	202.3	93.9
12:00	***	****	***	****	***
13:00	4.09	1760.5	0.27	115.1	93.5
14:00	3.95	1698.0	0.43	184.2	89.2
15:00	3.89	1673.0	0.39	167.8	90.0
16:00	3.87	1665.6	0.21	92.2	94.5
17:00	3.97	1707.5	0.21	88.9	94.8
18:00	3.89	1674.6	0.18	75.5	95.5
19:00	3.94	1693.6	0.20	84.8	95.0
20:00	4.04	1736.8	0.23	100.7	94.2
21:00	3.97	1705.2	0.20	87.8	94.9
22:00	4.02	1727.9	0.17	72.4	95.8
23:00	4.22	1812.7	0.17	71.5	96.1
Mean	5.21	2241.9	0.30	127.1	94.3
Maximum	8.36	3592.5	0.47	203.4	96.1
Minimum	3.87	1665.6	0.17	71.5	89.2
Std dev	2.19	940.6	0.11	48.7	1.7
% Std dev	42.0	42.0	38.3	38.3	1.8

Number of one-hour averages: 22
Percent coverage: 91.7

Daily Summary and Hourly Averages
March 16, 1981

Process Conditions

Average Boiler Load .... 106 mmBtu
Slurry pH 4.75
Adipic Acid concentration ... 1790 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	 ng/J	SO2 Outlet #/mmBtu	 ng/J	Eff %
00:00	4.02	1726.9	0.26	110.5	93.6
01:00	4.01	1724.0	0.27	114.6	93.4
02:00	3.96	1702.4	0.29	122.6	92.8
03:00	3.93	1691.5	0.28	119.6	92.9
04:00	3.82	1641.1	0.28	120.1	92.7
05:00	3.94	1695.5	0.29	124.8	92.6
06:00	3.98	1712.5	0.35	149.6	91.3
07:00	4.01	1726.0	0.49	210.2	87.8
08:00	4.11	1766.4	0.51	219.4	87.6
09:00	4.22	1815.3	0.26	112.7	93.8
10:00	4.23	1818.0	0.18	78.5	95.7
11:00	***	****	***	****	***
12:00	4.79	2060.9	0.54	232.2	88.7
13:00	4.42	1898.7	0.43	184.5	90.3
14:00	4.39	1886.1	0.48	206.5	89.1
15:00	6.39	2746.7	0.69	296.7	89.2
16:00	4.70	2022.6	0.44	189.6	90.6
17:00	4.68	2012.7	0.48	205.8	89.8
18:00	4.82	2072.9	0.54	232.1	88.8
19:00	4.93	2120.1	0.68	291.9	86.2
20:00	4.88	2099.5	0.88	378.2	82.0
21:00	4.90	2107.2	0.83	355.3	83.1
22:00	4.95	2127.2	0.89	383.2	82.0
23:00	4.99	2144.4	0.91	390.2	81.8
Mean	4.51	1938.9	0.50	216.3	88.8
Maximum	6.39	2746.7	0.91	390.2	95.7
Minimum	3.82	1641.1	0.18	78.5	81.8
Std dev	0.58	250.4	0.23	97.6	4.1
% Std dev	12.9	12.9	45.1	45.1	4.6

Number of one-hour averages: 23
Percent coverage: 95.8

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            Daily Summary and Hourly Averages
                     March 17, 1981

    Process Conditions

              Average Boiler Load ......... 108   mmBtu
              Slurry pH ................... 4.19
              Adipic Acid concentration ... 1945 ppm

    Scrubber Performance

-----------------------------------------------------------------
               SO2 Inlet             SO2 Outlet            Eff
   Time     #/mmBtu    ng/J       #/mmBtu    ng/J           %
-----------------------------------------------------------------
   00:00      4.37    1879.1        0.70     300.5        84.0
   01:00      4.37    1879.1        0.70     300.4        84.0
   02:00      4.35    1872.3        0.68     291.4        84.4
   03:00      4.31    1853.2        0.66     285.0        84.6
   04:00      4.32    1857.4        0.69     297.2        84.0
   05:00      4.23    1819.6        0.65     277.6        84.7
   06:00      4.17    1791.7        0.71     306.7        82.9
   07:00      4.00    1720.9        0.79     338.9        80.3
   08:00      3.82    1642.4        0.64     274.2        83.3
   09:00      3.82    1642.1        0.64     276.0        83.2
   10:00      3.99    1716.9        0.65     277.7        83.8
   11:00       ***      ****         ***      ****         ***
   12:00       ***      ****         ***      ****         ***
   13:00       ***      ****         ***      ****         ***
   14:00       ***      ****         ***      ****         ***
   15:00      3.41    1464.8        0.59     252.2        82.8
   16:00      3.56    1532.3        0.58     249.6        83.7
   17:00      3.49    1502.2        0.50     214.7        85.7
   18:00      3.45    1482.9        0.41     178.1        88.0
   19:00      3.43    1473.1        0.46     197.9        86.6
   20:00      3.49    1502.4        0.51     218.4        85.5
   21:00      3.47    1490.6        0.41     176.5        88.2
   22:00      3.47    1490.1        0.48     204.3        86.3
   23:00      3.36    1444.5        0.37     160.9        88.9

   Mean       3.83    1646.2        0.59     251.9        84.7
   Maximum    4.37    1879.1        0.79     338.9        88.9
   Minimum    3.36    1444.5        0.37     160.9        80.3
   Std dev    0.39     168.9        0.12      51.0         2.1
   % Std dev 10.3       10.3       20.3       20.3         2.4

   Number of one-hour averages: 20
   Percent coverage: 83.3
-----------------------------------------------------------------
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                Daily Summary and Hourly Averages
                         March 18, 1981

        Process Conditions

             Average Boiler Load .......... 106   mmBtu
             Slurry pH .................... 4.33
             Adipic Acid concentration .... 2390 ppm


        Scrubber Performance

-------------------------------------------------------------------------
                 SO2 Inlet                SO2 Outlet              Eff
   Time       #/mmBtu   ng/J          #/mmBtu     ng/J             %
-------------------------------------------------------------------------
   00:00        3.39   1457.5          0.38      164.0           88.7
   01:00        3.45   1485.2          0.43      186.3           87.5
   02:00        3.44   1477.7          0.46      195.8           86.8
   03:00        3.36   1443.6          0.49      212.1           85.3
   04:00        3.37   1449.9          0.57      245.0           83.1
   05:00        3.55   1527.1          0.68      292.3           80.9
   06:00        3.74   1608.8          0.74      320.1           80.1
   07:00        3.75   1611.9          0.68      294.3           81.7
   08:00        3.82   1640.5          0.76      327.3           80.1
   09:00        3.96   1703.7          0.82      352.4           79.3
   10:00        4.96   2132.3          0.99      425.0           80.1
   11:00        4.91   2109.8          1.08      465.3           77.9
   12:00        4.82   2072.2          1.02      440.1           78.8
   13:00         ***     ****           ***       ****            ***
   14:00         ***     ****           ***       ****            ***
   15:00         ***     ****           ***       ****            ***
   16:00         ***     ****           ***       ****            ***
   17:00        5.33   2292.7          0.72      308.4           86.5
   18:00        5.13   2206.3          0.85      365.2           83.4
   19:00        5.17   2222.7          0.75      324.3           85.4
   20:00        5.13   2205.1          0.73      313.1           85.8
   21:00        5.06   2176.4          0.80      344.0           84.2
   22:00        5.35   2301.1          0.84      360.7           84.3
   23:00        5.52   2371.8          0.90      387.7           83.7

   Mean         4.23   1819.5          0.71      305.3           83.2
   Maximum      5.52   2371.8          1.08      465.3           88.7
   Minimum      3.36   1443.6          0.38      164.0           77.9
   Std dev      0.84    359.2          0.20       84.3            3.2
   % Std dev   19.7      19.7         27.6        27.6            3.8

   Number of one-hour averages: 20
   Percent coverage: 83.3
-------------------------------------------------------------------------
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Daily Summary and Hourly Averages
March 19, 1981

Process Conditions

Average Boiler Load .... 121 mmBtu
Slurry pH 4.26
Adipic Acid concentration ... 2560 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	SO2 Inlet ng/J	SO2 Outlet #/mmBtu	SO2 Outlet ng/J	Eff %
00:00	5.75	2473.9	0.89	381.1	84.6
01:00	5.67	2439.0	0.89	381.5	84.4
02:00	5.58	2400.6	0.99	426.9	82.2
03:00	***	****	***	****	***
04:00	***	****	***	****	***
05:00	5.34	2296.8	0.87	372.2	83.8
06:00	5.09	2187.8	1.14	489.3	77.6
07:00	5.02	2160.1	1.16	499.9	76.9
08:00	5.03	2161.2	0.94	406.3	81.2
09:00	5.28	2271.5	0.70	299.5	86.8
10:00	5.51	2367.8	0.69	296.5	87.5
11:00	5.74	2466.8	0.95	406.9	83.5
12:00	5.40	2320.7	0.97	416.0	82.1
13:00	***	****	***	****	***
14:00	5.09	2187.3	0.70	300.1	86.3
15:00	5.17	2221.3	0.63	272.1	87.7
16:00	***	****	***	****	***
17:00	4.99	2147.3	0.40	171.3	92.0
18:00	4.76	2048.6	0.40	174.0	91.5
19:00	4.75	2042.1	0.41	175.9	91.4
20:00	4.80	2063.8	0.44	187.5	90.9
21:00	4.85	2085.7	0.35	150.6	92.8
22:00	4.89	2103.0	0.69	295.7	85.9
23:00	4.95	2127.2	0.37	159.0	92.5
Mean	5.14	2211.3	0.72	308.8	86.0
Maximum	5.75	2473.9	1.16	499.9	92.8
Minimum	4.75	2042.1	0.35	150.6	76.9
Std dev	0.33	143.5	0.27	114.0	4.8
% Std dev	6.5	6.5	36.9	36.9	5.6

Number of one-hour averages: 20
Percent coverage: 83.3

Daily Summary and Hourly Averages
March 20, 1981

Process Conditions

Average Boiler Load .... 118 mmBtu
Slurry pH 5.20
Adipic Acid concentration ... 3000 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	 ng/J	SO2 Outlet #/mmBtu	 ng/J	Eff %
00:00	4.63	1991.1	0.66	285.4	85.7
01:00	4.52	1943.1	0.60	256.5	86.8
02:00	4.56	1960.5	0.46	198.4	89.9
03:00	4.86	2090.4	0.33	141.2	93.2
04:00	***	****	***	****	***
05:00	5.30	2280.3	0.46	196.4	91.4
06:00	5.18	2227.0	0.44	189.0	91.5
07:00	***	****	***	****	***
08:00	4.63	1990.1	0.30	129.4	93.5
09:00	5.51	2368.3	0.22	95.4	96.0
10:00	4.96	2131.7	0.19	83.7	96.1
11:00	4.72	2028.6	0.25	105.5	94.8
12:00	4.66	2003.8	0.27	117.8	94.1
13:00	***	****	***	****	***
14:00	4.92	2115.0	0.28	121.6	94.2
15:00	5.02	2158.1	0.25	108.7	95.0
16:00	5.02	2159.3	0.33	140.3	93.5
17:00	5.19	2233.4	0.23	100.0	95.5
18:00	5.24	2252.9	0.28	118.5	94.7
19:00	5.10	2193.6	0.24	102.4	95.3
20:00	5.10	2190.9	0.26	113.2	94.8
21:00	5.04	2168.5	0.25	106.8	95.1
22:00	5.11	2198.4	0.24	103.4	95.3
23:00	5.29	2272.9	0.17	74.1	96.7
Mean	4.95	2126.3	0.32	139.0	93.5
Maximum	5.51	2368.3	0.66	285.4	96.7
Minimum	4.52	1943.1	0.17	74.1	85.7
Std dev	0.28	119.0	0.13	56.1	2.9
% Std dev	5.6	5.6	40.3	40.3	3.1

Number of one-hour averages: 21
Percent coverage: 87.5

Daily Summary and Hourly Averages
March 21, 1981

Process Conditions

Average Boiler Load .... 103 mmBtu
Slurry pH 5.40
Adipic Acid concentration ... 2680 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	SO2 Inlet ng/J	SO2 Outlet #/mmBtu	SO2 Outlet ng/J	Eff %
00:00	5.16	2218.9	0.20	86.6	96.1
01:00	5.12	2199.2	0.15	64.8	97.1
02:00	5.06	2173.8	0.15	65.0	97.0
03:00	4.98	2139.9	0.13	56.2	97.4
04:00	4.97	2135.8	0.15	64.6	97.0
05:00	5.03	2162.1	0.15	62.7	97.1
06:00	5.13	2206.8	0.18	77.4	96.5
07:00	5.24	2251.4	0.18	77.5	96.6
08:00	5.38	2312.1	0.15	63.1	97.3
09:00	5.36	2306.5	0.16	68.9	97.0
10:00	5.45	2341.1	0.20	86.4	96.3
11:00	5.13	2207.1	0.20	84.3	96.2
12:00	5.25	2258.4	0.18	76.5	96.6
13:00	***	****	***	****	***
14:00	***	****	***	****	***
15:00	***	****	***	****	***
16:00	5.23	2250.5	0.05	23.6	98.9
17:00	5.66	2435.1	0.08	35.3	98.5
18:00	5.43	2336.2	0.11	45.2	98.1
19:00	5.49	2360.4	0.12	51.2	97.8
20:00	5.36	2304.4	0.08	33.2	98.6
21:00	5.21	2240.5	0.08	34.6	98.5
22:00	***	****	***	****	***
23:00	***	****	***	****	***
Mean	5.22	2246.1	0.15	62.6	97.2
Maximum	5.66	2435.1	0.20	86.6	98.9
Minimum	4.97	2135.8	0.05	23.6	96.1
Std dev	0.19	81.4	0.04	19.3	0.9
% Std dev	3.6	3.6	30.8	30.8	0.9

Number of one-hour averages: 19
Percent coverage: 79.2

Daily Summary and Hourly Averages
March 22, 1981

Process Conditions

Average Boiler Load .... 98 mmBtu
Slurry pH 5.38
Adipic Acid concentration ... 2420 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	SO2 Inlet ng/J	SO2 Outlet #/mmBtu	SO2 Outlet ng/J	Eff %
00:00	5.09	2189.5	0.20	84.7	96.1
01:00	5.16	2220.3	0.20	85.9	96.1
02:00	5.23	2249.8	0.19	79.6	96.5
03:00	5.22	2245.3	0.18	77.1	96.6
04:00	5.14	2210.3	0.21	90.2	95.9
05:00	5.13	2207.6	0.19	83.4	96.2
06:00	5.13	2205.2	0.20	84.0	96.2
07:00	5.06	2173.5	0.21	88.3	95.9
08:00	4.98	2142.2	0.20	85.5	96.0
09:00	4.88	2098.2	0.19	82.1	96.1
10:00	4.79	2060.0	0.16	67.1	96.7
11:00	4.67	2005.8	0.14	61.9	96.9
12:00	4.58	1969.0	0.18	76.3	96.1
13:00	***	****	***	****	***
14:00	3.69	1587.7	0.13	55.2	96.5
15:00	3.97	1705.5	0.12	52.2	96.9
16:00	4.26	1833.1	0.13	56.7	96.9
17:00	4.33	1861.5	0.18	78.6	95.8
18:00	4.42	1901.4	0.23	98.3	94.8
19:00	4.25	1828.6	0.30	128.1	93.0
20:00	4.04	1737.7	0.35	150.7	91.3
21:00	3.74	1607.6	0.38	163.6	89.8
22:00	3.90	1678.4	0.56	240.0	85.7
23:00	4.70	2019.1	0.86	371.4	81.6
Mean	4.64	1994.1	0.25	108.2	94.6
Maximum	5.23	2249.8	0.86	371.4	96.9
Minimum	3.69	1587.7	0.12	52.2	81.6
Std dev	0.51	220.4	0.17	71.4	3.9
% Std dev	11.1	11.1	66.0	66.0	4.1

Number of one-hour averages: 23
Percent coverage: 95.8

Daily Summary and Hourly Averages
March 23, 1981

Process Conditions

Average Boiler Load .... 89 mmBtu
Slurry pH 5.07
Adipic Acid concentration ... 2160 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	SO2 Inlet ng/J	SO2 Outlet #/mmBtu	SO2 Outlet ng/J	Eff %
00:00	4.75	2043.3	1.16	498.2	75.6
01:00	4.65	1999.4	0.97	416.6	79.2
02:00	4.30	1847.7	0.94	405.1	78.1
03:00	4.08	1753.3	1.09	470.5	73.2
04:00	4.02	1727.8	1.01	433.3	74.9
05:00	3.91	1679.4	1.18	507.0	69.8
06:00	3.70	1589.8	1.29	554.6	65.1
07:00	3.73	1601.7	1.14	488.9	69.5
08:00	3.15	1355.4	0.77	330.8	75.6
09:00	***	****	***	****	***
10:00	***	****	***	****	***
11:00	5.94	2555.5	0.64	274.1	89.3
12:00	5.63	2418.8	0.65	280.4	88.4
13:00	***	****	***	****	***
14:00	***	****	***	****	***
15:00	7.54	3243.2	0.61	264.2	91.9
16:00	7.00	3010.0	0.41	174.9	94.2
17:00	5.79	2488.4	0.46	199.1	92.0
18:00	5.84	2510.0	0.58	251.0	90.0
19:00	6.27	2696.0	0.72	309.3	88.5
20:00	6.53	2808.1	0.88	378.4	86.5
21:00	6.34	2726.4	0.83	358.5	86.9
22:00	6.42	2758.4	0.79	341.6	87.6
23:00	6.88	2957.3	0.75	321.9	89.1
Mean	5.09	2187.9	0.89	382.2	82.5
Maximum	7.54	3243.2	1.29	554.6	94.2
Minimum	3.15	1355.4	0.41	174.9	65.1
Std dev	1.33	573.4	0.25	109.0	8.9
% Std dev	26.2	26.2	28.5	28.5	10.8

Number of one-hour averages: 20
Percent coverage: 83.3

Daily Summary and Hourly Averages
March 24, 1981

Process Conditions

Average Boiler Load .... 98 mmBtu
Slurry pH 4.68
Adipic Acid concentration ... 2200 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	 ng/J	SO2 Outlet #/mmBtu	 ng/J	Eff %
00:00	7.28	3131.5	2.20	947.4	69.7
01:00	6.99	3004.2	0.77	330.8	89.0
02:00	6.62	2846.3	0.84	363.2	87.2
03:00	6.24	2684.8	0.73	313.4	88.3
04:00	6.37	2739.8	0.72	308.7	88.7
05:00	6.61	2843.9	0.61	263.6	90.7
06:00	6.31	2713.2	0.75	321.7	88.1
07:00	6.12	2629.2	0.70	301.8	88.5
08:00	5.58	2398.3	0.79	338.9	85.9
09:00	***	****	***	****	***
10:00	5.10	2192.9	0.66	285.8	87.0
11:00	4.79	2058.0	0.61	260.6	87.3
12:00	***	****	***	****	***
13:00	4.58	1968.6	0.30	130.9	93.4
14:00	4.77	2050.5	0.28	119.6	94.2
15:00	5.19	2231.3	0.22	95.2	95.7
16:00	5.01	2152.5	0.21	91.0	95.8
17:00	4.67	2006.7	0.23	99.6	95.0
18:00	4.94	2124.7	0.40	173.3	91.8
19:00	4.92	2117.1	0.40	173.9	91.8
20:00	4.82	2070.4	0.44	188.5	90.9
21:00	4.93	2121.5	0.37	158.9	92.5
22:00	5.00	2150.0	0.41	174.6	91.9
23:00	4.79	2060.5	0.50	217.1	89.5
Mean	5.48	2354.3	0.55	237.0	89.9
Maximum	7.28	3131.5	2.20	947.4	95.8
Minimum	4.58	1968.6	0.21	91.0	69.7
Std dev	0.86	370.1	0.42	178.9	5.3
% Std dev	15.7	15.7	75.5	75.5	5.9

Number of one-hour averages: 22
Percent coverage: 91.7

Daily Summary and Hourly Averages
March 25, 1981

Process Conditions

Average Boiler Load .... 95 mmBtu
Slurry pH 5.20
Adipic Acid concentration .... 2240 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	SO2 Inlet ng/J	SO2 Outlet #/mmBtu	SO2 Outlet ng/J	Eff %
00:00	4.64	1994.0	0.43	184.7	90.7
01:00	4.66	2004.0	0.50	212.9	89.4
02:00	4.72	2029.2	0.51	219.7	89.2
03:00	4.80	2063.8	0.35	151.2	92.7
04:00	4.77	2050.3	0.40	173.9	91.5
05:00	4.71	2024.3	0.38	162.5	92.0
06:00	4.73	2033.2	0.30	127.0	93.8
07:00	4.68	2012.0	0.38	165.1	91.8
08:00	4.56	1962.4	0.26	113.5	94.2
09:00	4.93	2121.5	0.22	94.9	95.5
10:00	5.01	2153.8	0.28	118.5	94.5
11:00	5.28	2268.3	0.28	122.3	94.6
12:00	4.96	2131.3	0.28	118.5	94.4
13:00	5.33	2293.7	0.18	78.1	96.6
14:00	6.21	2670.8	0.25	107.4	96.0
15:00	5.82	2501.1	0.21	89.4	96.4
16:00	5.43	2334.2	0.09	37.8	98.4
17:00	5.71	2454.2	0.21	91.5	96.3
18:00	***	****	***	****	***
19:00	***	****	***	****	***
20:00	***	****	***	****	***
21:00	***	****	***	****	***
22:00	***	****	***	****	***
23:00	***	****	***	****	***
Mean	4.97	2134.9	0.32	137.8	93.5
Maximum	6.21	2670.8	0.51	219.7	98.4
Minimum	4.56	1962.4	0.09	37.8	89.2
Std dev	0.48	207.8	0.11	48.4	2.6
% Std dev	9.7	9.7	35.2	35.2	2.8

Number of one-hour averages: 18
Percent coverage: 75.0

Daily Summary and Hourly Averages
March 26, 1981

Process Conditions

Average Boiler Load .... 93 mmBtu
Slurry pH 5.30
Adipic Acid concentration .... 2150 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	SO2 Inlet ng/J	SO2 Outlet #/mmBtu	SO2 Outlet ng/J	Eff %
00:00	***	****	***	****	***
01:00	7.20	3094.4	0.33	143.8	95.4
02:00	8.66	3722.5	0.40	172.2	95.4
03:00	9.42	4048.1	0.44	191.1	95.3
04:00	8.60	3699.0	0.42	179.8	95.1
05:00	8.93	3841.4	0.47	203.9	94.7
06:00	7.85	3377.1	0.45	192.3	94.3
07:00	6.88	2957.2	0.53	226.1	92.4
08:00	6.97	2995.6	1.00	428.8	85.7
09:00	7.19	3092.8	0.61	262.6	91.5
10:00	5.18	2225.9	0.45	192.7	91.3
11:00	5.36	2304.6	0.28	121.9	94.7
12:00	5.34	2294.8	0.23	99.8	95.7
13:00	5.29	2276.5	0.15	65.2	97.1
14:00	5.03	2161.2	0.13	58.0	97.3
15:00	***	****	***	****	***
16:00	***	****	***	****	***
17:00	5.39	2315.7	0.25	109.3	95.3
18:00	5.48	2356.9	0.27	116.6	95.1
19:00	5.86	2519.2	0.26	113.7	95.5
20:00	5.68	2443.5	0.22	92.5	96.2
21:00	5.35	2299.8	0.18	79.4	96.5
22:00	5.00	2151.1	0.17	73.7	96.6
23:00	4.52	1941.5	0.19	82.1	95.8
Mean	6.15	2646.1	0.32	138.4	94.8
Maximum	9.42	4048.1	1.00	428.8	97.3
Minimum	4.52	1941.5	0.13	58.0	85.7
Std dev	1.54	660.1	0.20	87.1	2.6
% Std dev	24.9	24.9	62.9	62.9	2.7

Number of one-hour averages: 21
Percent coverage: 87.5

Daily Summary and Hourly Averages
March 27, 1981

Process Conditions

Average Boiler Load .... 95 mmBtu
Slurry pH 5.0
Adipic Acid concentration .... 2130 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	SO2 Inlet ng/J	SO2 Outlet #/mmBtu	SO2 Outlet ng/J	Eff %
00:00	***	****	***	****	***
01:00	5.88	2526.5	0.20	84.3	96.7
02:00	5.59	2403.7	0.21	92.0	96.2
03:00	5.39	2318.8	0.24	103.0	95.6
04:00	5.55	2386.3	0.22	96.6	96.0
05:00	5.99	2575.5	0.21	92.0	96.4
06:00	6.25	2685.7	0.22	94.0	96.5
07:00	5.55	2384.2	0.23	97.3	95.9
08:00	5.32	2286.5	0.34	148.2	93.5
09:00	***	****	***	****	***
10:00	4.07	1751.3	0.26	111.2	93.7
11:00	4.49	1931.6	0.32	137.1	92.9
12:00	4.80	2064.6	0.33	142.5	93.1
13:00	4.86	2091.0	0.32	137.9	93.4
14:00	4.99	2147.2	0.34	144.2	93.3
15:00	4.81	2066.4	0.39	169.7	91.8
16:00	***	****	***	****	***
17:00	4.57	1962.9	0.28	121.3	93.8
18:00	4.39	1885.7	0.27	115.2	93.9
19:00	4.30	1847.1	0.30	127.1	93.1
20:00	4.32	1856.4	0.39	166.8	91.0
21:00	4.29	1846.2	0.29	122.7	93.4
22:00	4.36	1876.0	0.34	146.9	92.2
23:00	4.28	1838.9	0.30	130.7	92.9
Mean	4.85	2083.7	0.29	125.2	94.0
Maximum	6.25	2685.7	0.39	169.7	96.7
Minimum	4.07	1751.3	0.20	84.3	91.0
Std dev	0.67	286.4	0.06	25.5	1.7
% Std dev	13.7	13.7	20.3	20.3	1.8

Number of one-hour averages: 21
Percent coverage: 87.5

Daily Summary and Hourly Averages
March 28, 1981

Process Conditions

Average Boiler Load .... 89 mmBtu
Slurry pH 5.1
Adipic Acid concentration ... 2100 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	SO2 Inlet ng/J	SO2 Outlet #/mmBtu	SO2 Outlet ng/J	Eff %
00:00	4.40	1893.1	0.30	128.4	93.2
01:00	4.56	1958.6	0.25	106.9	94.5
02:00	4.57	1964.4	0.26	111.8	94.3
03:00	4.48	1926.7	0.27	114.8	94.0
04:00	4.60	1976.0	0.32	139.0	93.0
05:00	4.60	1978.4	0.37	158.3	92.0
06:00	4.36	1872.7	0.45	195.0	89.6
07:00	4.30	1849.4	0.45	192.4	89.6
08:00	4.19	1802.8	0.50	214.1	88.1
09:00	4.15	1786.0	0.53	228.0	87.2
10:00	4.44	1909.4	0.31	135.4	92.9
11:00	4.17	1794.1	0.25	105.9	94.1
12:00	4.21	1810.4	0.22	93.1	94.9
13:00	***	****	***	****	***
14:00	4.30	1849.1	0.60	258.4	86.0
15:00	4.15	1782.2	0.78	335.3	81.2
16:00	4.39	1887.1	0.70	299.7	84.1
17:00	4.62	1988.3	0.48	204.9	89.7
18:00	5.31	2282.5	0.38	165.2	92.8
19:00	4.57	1966.1	0.39	167.0	91.5
20:00	4.80	2063.5	0.34	145.3	93.0
21:00	5.07	2179.2	0.39	168.3	92.3
22:00	5.49	2360.4	0.71	303.5	87.1
23:00	5.35	2299.2	0.93	399.5	82.6
Mean	4.52	1943.8	0.43	186.2	90.4
Maximum	5.49	2360.4	0.93	399.5	94.9
Minimum	4.15	1782.2	0.22	93.1	81.2
Std dev	0.39	169.4	0.19	81.6	4.0
% Std dev	8.7	8.7	43.8	43.8	4.4

Number of one-hour averages: 23
Percent coverage: 95.8

Daily Summary and Hourly Averages
March 29, 1981

Process Conditions

Average Boiler Load .... 79 [illegible]/mmBtu
Slurry pH 5.1
Adipic Acid concentration ... 2100 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	SO2 Inlet ng/J	SO2 Outlet #/mmBtu	SO2 Outlet ng/J	Eff %
00:00	5.70	2451.3	0.94	402.8	83.6
01:00	5.46	2348.4	1.00	431.2	81.6
02:00	5.38	2311.1	1.06	456.2	80.3
03:00	4.96	2131.6	1.02	437.7	79.5
04:00	4.79	2058.5	1.09	469.0	77.2
05:00	***	****	***	****	***
06:00	***	****	***	****	***
07:00	***	****	***	****	***
08:00	***	****	***	****	***
09:00	5.82	2504.2	1.17	504.3	79.9
10:00	***	****	***	****	***
11:00	8.13	3493.4	0.38	161.4	95.4
12:00	7.87	3381.8	0.71	304.5	91.0
13:00	7.56	3250.2	0.86	370.1	88.6
14:00	6.68	2872.1	0.39	167.3	94.2
15:00	6.43	2763.8	0.17	75.2	97.3
16:00	6.41	2754.8	0.19	80.6	97.1
17:00	6.70	2879.1	0.17	73.7	97.4
18:00	6.98	2998.9	0.66	282.6	90.6
19:00	6.70	2879.2	0.38	165.5	94.3
20:00	6.82	2934.2	0.24	102.6	96.5
21:00	7.20	3096.9	0.19	83.6	97.3
22:00	7.85	3376.9	0.16	69.6	97.9
23:00	8.00	3437.5	0.29	122.6	96.4
Mean	6.43	2763.8	0.61	263.1	90.5
Maximum	8.13	3493.4	1.17	504.3	97.9
Minimum	4.79	2058.5	0.16	69.6	77.2
Std dev	1.05	450.6	0.38	163.0	7.5
% Std dev	16.3	16.3	62.0	62.0	8.3

Number of one-hour averages: 19
Percent coverage: 79.2

Daily Summary and Hourly Averages
March 30, 1981

Process Conditions

Average Boiler Load .... 75 mmBtu
Slurry pH 4.90
Adipic Acid concentration ... 1920 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	SO2 Inlet ng/J	SO2 Outlet #/mmBtu	SO2 Outlet ng/J	Eff %
00:00	8.36	3593.1	1.58	677.6	81.1
01:00	7.55	3246.3	0.25	109.5	96.6
02:00	8.33	3580.4	0.36	156.1	95.6
03:00	8.01	3442.7	1.49	641.8	81.4
04:00	7.62	3277.2	1.32	567.1	82.7
05:00	6.16	2647.9	0.83	358.4	86.5
06:00	6.65	2860.6	0.57	243.5	91.5
07:00	6.13	2634.4	0.42	182.4	93.1
08:00	2.42	1040.0	0.11	47.8	95.4
09:00	***	****	***	****	***
10:00	4.58	1967.1	0.34	147.0	92.5
11:00	3.13	1347.5	0.25	107.8	92.0
12:00	4.81	2068.2	0.15	62.5	97.0
13:00	4.93	2118.2	0.18	76.2	96.4
14:00	4.95	2129.4	0.12	51.6	97.6
15:00	4.23	1820.4	0.11	48.2	97.4
16:00	4.24	1821.4	0.21	90.7	95.0
17:00	4.70	2020.5	0.30	128.3	93.7
18:00	6.33	2722.5	0.70	301.7	88.9
19:00	***	****	***	****	***
20:00	***	****	***	****	***
21:00	***	****	***	****	***
22:00	***	****	***	****	***
23:00	***	****	***	****	***
Mean	5.38	2315.2	0.36	153.0	93.4
Maximum	8.36	3593.1	1.58	677.6	97.6
Minimum	2.42	1040.0	0.11	47.8	81.1
Std dev	1.82	780.9	0.51	218.8	5.7
% Std dev	33.7	33.7	143.0	143.0	6.2

Number of one-hour averages: 18
Percent coverage: 75.0

Daily Summary and Hourly Averages
April 2, 1981

Process Conditions

Average Boiler Load .... 71 mmBtu
Slurry pH 5.50
Adipic Acid concentration .... 1950 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	SO2 Inlet ng/J	SO2 Outlet #/mmBtu	SO2 Outlet ng/J	Eff %
00:00	4.87	2093.8	0.15	66.6	96.8
01:00	4.77	2052.6	0.21	90.1	95.6
02:00	4.88	2098.4	0.25	106.9	94.9
03:00	5.07	2177.7	0.25	109.6	95.0
04:00	5.35	2298.9	0.22	95.0	95.9
05:00	5.59	2403.2	0.22	92.8	96.1
06:00	5.31	2284.0	0.22	96.1	95.8
07:00	5.15	2216.1	0.21	91.4	95.9
08:00	4.92	2115.4	0.20	86.4	95.9
09:00	4.29	1846.6	0.12	49.5	97.3
10:00	4.66	2004.4	0.13	58.0	97.1
11:00	4.59	1971.9	0.05	22.4	98.9
12:00	4.54	1950.4	0.02	8.3	99.6
13:00	4.29	1846.2	0.03	10.9	99.4
14:00	4.42	1902.1	0.03	12.9	99.3
15:00	4.56	1961.3	0.06	24.3	98.8
16:00	4.71	2023.9	0.07	31.3	98.5
17:00	4.65	1999.4	0.08	33.0	98.3
18:00	4.71	2026.8	0.09	36.6	98.2
19:00	4.87	2094.4	0.11	46.6	97.8
20:00	4.98	2142.3	0.12	49.8	97.7
21:00	4.93	2120.0	0.15	64.0	97.0
22:00	4.95	2127.9	0.15	64.5	97.0
23:00	5.00	2148.8	0.14	58.8	97.3
Mean	4.83	2076.2	0.14	58.9	97.2
Maximum	5.59	2403.2	0.25	109.6	99.6
Minimum	4.29	1846.2	0.02	8.3	94.9
Std dev	0.32	138.2	0.07	31.9	1.4
% Std dev	6.7	6.7	54.1	54.1	1.5

Number of one-hour averages: 24
Percent coverage: 100.0

Daily Summary and Hourly Averages
April 3, 1981

Process Conditions

Average Boiler Load .... 71 mmBtu
Slurry pH 4.80
Adipic Acid concentration ... 2040 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	ng/J	SO2 Outlet #/mmBtu	ng/J	Eff %
00:00	5.16	2216.7	0.18	77.5	96.5
01:00	4.95	2128.5	0.14	62.2	97.1
02:00	4.92	2114.6	0.10	43.4	97.9
03:00	4.83	2077.9	0.11	45.8	97.8
04:00	4.88	2098.3	0.11	48.3	97.7
05:00	5.02	2157.3	0.13	57.0	97.4
06:00	5.01	2154.9	0.18	76.6	96.4
07:00	5.01	2154.1	0.19	82.7	96.2
08:00	3.90	1675.5	0.08	33.1	98.0
09:00	4.53	1945.9	0.21	89.2	95.4
10:00	4.49	1929.0	0.23	99.7	94.8
11:00	4.58	1970.2	0.15	66.3	96.6
12:00	***	****	***	****	***
13:00	***	****	***	****	***
14:00	5.53	2379.7	0.19	83.8	96.5
15:00	***	****	***	****	***
16:00	6.01	2584.9	0.08	33.9	98.7
17:00	5.66	2434.5	0.12	49.8	98.0
18:00	6.01	2584.6	0.10	41.3	98.4
19:00	5.94	2551.9	0.10	42.2	98.3
20:00	5.71	2455.5	0.07	28.1	98.9
21:00	4.95	2130.3	0.07	31.8	98.5
22:00	4.96	2132.4	0.08	35.3	98.3
23:00	4.50	1932.7	00.00	1.8	99.9
Mean	5.07	2179.7	0.13	55.9	97.4
Maximum	6.01	2584.9	0.23	99.7	99.9
Minimum	3.90	1675.5	00.00	1.8	94.8
Std dev	0.56	240.4	0.06	24.5	1.2
% Std dev	11.0	11.0	43.9	43.9	1.3

Number of one-hour averages: 21
Percent coverage: 87.5

Daily Summary and Hourly Averages
April 4, 1981

Process Conditions

Average Boiler Load .... 80 mmBtu
Slurry pH 4.70
Adipic Acid concentration ... 2160 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	SO2 Inlet ng/J	SO2 Outlet #/mmBtu	SO2 Outlet ng/J	Eff %
00:00	5.10	2194.0	0.06	24.6	98.9
01:00	4.95	2127.5	0.08	32.7	98.5
02:00	4.92	2117.3	0.10	41.3	98.0
03:00	5.07	2180.8	0.09	38.1	98.3
04:00	4.81	2068.0	0.10	44.4	97.9
05:00	4.88	2099.5	0.13	56.9	97.3
06:00	5.02	2157.5	0.16	69.5	96.8
07:00	4.97	2137.3	0.18	78.0	96.4
08:00	4.64	1995.8	0.20	87.5	95.6
09:00	4.58	1968.1	0.22	96.7	95.1
10:00	4.55	1954.2	0.20	87.7	95.5
11:00	4.38	1882.6	0.18	79.5	95.8
12:00	4.60	1979.2	0.25	109.1	94.5
13:00	***	****	***	****	***
14:00	4.09	1760.1	0.34	144.3	91.8
15:00	***	****	***	****	***
16:00	4.74	2039.4	0.23	98.9	95.1
17:00	5.29	2276.2	0.26	111.4	95.1
18:00	5.06	2174.2	0.20	85.8	96.1
19:00	5.05	2172.9	0.20	84.9	96.1
20:00	4.97	2134.9	0.17	74.0	96.5
21:00	4.85	2087.4	0.19	83.1	96.0
22:00	4.74	2037.1	0.19	82.0	96.0
23:00	4.75	2041.0	0.23	98.0	95.2
Mean	4.79	2061.1	0.18	78.9	96.2
Maximum	5.29	2276.2	0.34	144.3	98.9
Minimum	4.09	1760.1	0.06	24.6	91.8
Std dev	0.27	117.3	0.07	28.9	1.6
% Std dev	5.7	5.7	36.6	36.6	1.6

Number of one-hour averages: 22
Percent coverage: 91.7

Daily Summary and Hourly Averages
April 5, 1981

Process Conditions

Average Boiler Load .... 82 mmBtu
Slurry pH 4.60
Adipic Acid concentration ... 2200 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	ng/J	SO2 Outlet #/mmBtu	ng/J	Eff %
00:00	4.77	2051.3	0.21	89.5	95.6
01:00	4.70	2019.4	0.24	102.3	94.9
02:00	4.84	2082.5	0.16	69.3	96.7
03:00	5.08	2185.6	0.14	59.0	97.3
04:00	5.10	2192.2	0.20	87.0	96.0
05:00	4.98	2140.0	0.30	128.7	94.0
06:00	5.01	2153.9	0.33	140.6	93.5
07:00	4.90	2105.7	0.32	136.2	93.5
08:00	4.93	2117.8	0.32	136.2	93.6
09:00	4.96	2134.1	0.34	147.2	93.1
10:00	4.88	2097.1	0.41	177.9	91.5
11:00	5.14	2209.1	0.37	157.5	92.9
12:00	5.22	2244.0	0.37	158.7	92.9
13:00	***	****	***	****	***
14:00	***	****	***	****	***
15:00	5.57	2395.1	0.42	179.0	92.5
16:00	5.74	2468.9	0.37	158.4	93.6
17:00	5.89	2532.7	0.33	140.2	94.5
18:00	5.82	2503.2	0.30	127.9	94.9
19:00	5.99	2577.0	0.30	129.1	95.0
20:00	5.73	2462.7	0.38	161.3	93.4
21:00	5.78	2483.2	0.60	256.4	89.7
22:00	5.58	2397.1	0.50	214.5	91.1
23:00	5.42	2331.1	0.36	156.0	93.3
Mean	5.27	2264.0	0.33	142.1	93.7
Maximum	5.99	2577.0	0.60	256.4	97.3
Minimum	4.70	2019.4	0.14	59.0	89.7
Std dev	0.41	178.3	0.10	45.0	1.8
% Std dev	7.9	7.9	31.7	31.7	1.9

Number of one-hour averages: 22
Percent coverage: 91.7

Daily Summary and Hourly Averages
April 6, 1981

Process Conditions

Average Boiler Load .... 77 #/mmBtu
Slurry pH 5.20
Adipic Acid concentration .... 2170 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	SO2 Inlet ng/J	SO2 Outlet #/mmBtu	SO2 Outlet ng/J	Eff %
00:00	5.79	2490.3	0.28	121.0	95.1
01:00	6.03	2590.9	0.23	97.0	96.3
02:00	6.01	2584.4	0.22	94.6	96.3
03:00	5.73	2465.4	0.24	104.2	95.8
04:00	5.64	2423.6	0.24	101.6	95.8
05:00	5.44	2339.9	0.28	121.1	94.8
06:00	5.35	2300.4	0.33	141.2	93.9
07:00	5.20	2236.8	0.44	187.7	91.6
08:00	5.33	2291.9	0.43	187.0	91.8
09:00	5.35	2298.3	0.25	109.5	95.2
10:00	5.13	2207.1	0.22	94.9	95.7
11:00	4.35	1871.6	0.11	45.4	97.6
12:00	4.54	1953.2	0.08	34.6	98.2
13:00	4.35	1870.6	0.10	44.9	97.6
14:00	4.71	2027.1	0.10	40.9	98.0
15:00	4.52	1942.2	0.04	18.3	99.1
16:00	***	****	***	****	***
17:00	***	****	***	****	***
18:00	4.66	2005.5	0.07	30.5	98.5
19:00	4.62	1986.1	0.03	13.8	99.3
20:00	4.88	2097.2	0.05	19.4	99.1
21:00	5.58	2400.7	0.09	40.4	98.3
22:00	5.08	2186.1	0.12	51.7	97.6
23:00	5.14	2207.8	0.12	52.1	97.6
Mean	5.15	2214.7	0.19	82.2	96.3
Maximum	6.03	2590.9	0.44	187.7	99.3
Minimum	4.35	1870.6	0.03	13.8	91.6
Std dev	0.52	224.3	0.12	51.8	2.2
% Std dev	10.1	10.1	63.0	63.0	2.3

Number of one-hour averages: 22
Percent coverage: 91.7

Daily Summary and Hourly Averages
April 7, 1981

Process Conditions

Average Boiler Load .... 75 #/mmBtu
Slurry pH 5.10
Adipic Acid concentration .... 2820 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	SO2 Inlet ng/J	SO2 Outlet #/mmBtu	SO2 Outlet ng/J	Eff %
00:00	5.70	2452.2	0.13	54.3	97.8
01:00	5.88	2527.5	0.14	60.8	97.6
02:00	5.91	2538.9	0.12	51.6	98.0
03:00	5.89	2530.9	0.13	55.4	97.8
04:00	6.76	2907.3	0.15	65.5	97.7
05:00	5.96	2563.3	0.14	61.7	97.6
06:00	6.22	2672.9	0.19	82.0	96.9
07:00	5.77	2481.1	0.19	81.5	96.7
08:00	***	****	***	****	***
09:00	***	****	***	****	***
10:00	5.26	2261.7	0.11	48.7	97.8
11:00	4.89	2102.1	0.10	44.3	97.9
12:00	4.91	2110.7	0.10	45.1	97.9
13:00	4.77	2051.1	0.06	25.9	98.7
14:00	4.14	1781.7	0.04	18.9	98.9
15:00	4.55	1956.2	0.09	40.6	97.9
16:00	4.62	1986.9	0.09	39.7	98.0
17:00	4.96	2132.0	0.07	30.8	98.6
18:00	5.39	2318.1	0.14	59.4	97.4
19:00	5.36	2303.6	0.17	74.4	96.8
20:00	5.55	2385.1	0.53	228.6	90.4
21:00	5.30	2277.8	0.20	86.4	96.2
22:00	5.29	2275.0	0.13	57.3	97.5
23:00	5.63	2418.7	0.62	265.6	89.0
Mean	5.40	2321.6	0.17	71.2	96.9
Maximum	6.76	2907.3	0.62	265.6	98.9
Minimum	4.14	1781.7	0.04	18.9	89.0
Std dev	0.61	263.8	0.14	59.7	2.4
% Std dev	11.4	11.4	83.8	83.8	2.5

Number of one-hour averages: 22
Percent coverage: 91.7

Daily Summary and Hourly Averages
April 8, 1981

Process Conditions

Average Boiler Load .... 69 #/mmBtu
Slurry pH 5.05
Adipic Acid concentration ... 2850 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	SO2 Inlet ng/J	SO2 Outlet #/mmBtu	SO2 Outlet ng/J	Eff %
00:00	5.59	2401.8	0.91	391.4	83.7
01:00	5.60	2409.4	0.66	282.6	88.3
02:00	5.74	2468.4	0.29	122.8	95.0
03:00	5.51	2367.1	0.15	65.2	97.2
04:00	5.55	2384.1	0.14	60.1	97.5
05:00	5.23	2249.9	0.10	44.2	98.0
06:00	5.49	2360.0	0.09	40.5	98.3
07:00	5.18	2227.8	0.09	40.3	98.2
08:00	5.01	2154.5	0.22	96.3	95.5
09:00	***	****	***	****	***
10:00	6.07	2610.4	0.25	109.5	95.8
11:00	5.28	2268.4	0.17	72.8	96.8
12:00	5.15	2214.5	0.09	40.7	98.2
13:00	5.27	2264.2	0.08	33.7	98.5
14:00	5.59	2405.0	0.07	29.5	98.8
15:00	5.11	2196.8	0.05	21.4	99.0
16:00	5.24	2251.6	0.08	34.3	98.5
17:00	5.39	2316.0	0.09	40.5	98.3
18:00	5.64	2424.1	0.30	130.0	94.6
19:00	5.74	2469.7	0.32	136.8	94.5
20:00	5.44	2340.2	0.17	72.4	96.9
21:00	5.87	2525.1	0.18	77.9	96.9
22:00	5.98	2571.1	0.16	68.7	97.3
23:00	5.91	2541.4	0.28	119.0	95.3
Mean	5.50	2362.6	0.21	90.4	96.2
Maximum	6.07	2610.4	0.91	391.4	99.0
Minimum	5.01	2154.5	0.05	21.4	83.7
Std dev	0.29	126.6	0.20	86.1	3.6
% Std dev	5.4	5.4	95.2	95.2	3.7

Number of one-hour averages: 23
Percent coverage: 95.8

Daily Summary and Hourly Averages
April 9, 1981

Process Conditions

Average Boiler Load .... 69 [illegible]/mmBtu
Slurry pH 4.60
Adipic Acid concentration ... 2510 ppm

Scrubber Performance

	SO2 Inlet		SO2 Outlet		Eff
Time	#/mmBtu	ng/J	#/mmBtu	ng/J	%
00:00	6.14	2638.6	0.30	128.1	95.1
01:00	6.14	2638.1	0.31	134.2	94.9
02:00	6.27	2697.3	0.27	117.3	95.7
03:00	6.19	2661.2	0.31	133.9	95.0
04:00	5.98	2572.9	0.28	122.3	95.2
05:00	5.84	2509.8	0.35	149.6	94.0
06:00	5.96	2563.7	0.40	170.2	93.4
07:00	6.10	2624.5	0.39	167.9	93.6
08:00	***	****	***	****	***
09:00	6.61	2840.5	0.59	254.7	91.0
10:00	7.52	3231.1	0.54	230.5	92.9
11:00	6.85	2946.4	0.50	215.8	92.7
12:00	6.12	2632.6	0.40	170.8	93.5
13:00	6.48	2785.4	0.31	132.7	95.2
14:00	***	****	***	****	***
15:00	5.47	2352.9	0.33	140.4	94.0
16:00	5.25	2258.9	0.30	128.1	94.3
17:00	5.32	2289.4	0.27	118.0	94.8
18:00	5.56	2390.1	0.25	105.7	95.6
19:00	5.89	2534.0	0.26	112.6	95.6
20:00	6.50	2794.3	0.27	118.2	95.8
21:00	6.68	2873.8	0.34	146.9	94.9
22:00	6.43	2765.1	0.31	132.3	95.2
23:00	8.28	3558.2	0.37	158.4	95.5
Mean	6.16	2646.5	0.34	147.5	94.4
Maximum	8.28	3558.2	0.59	254.7	95.8
Minimum	5.25	2258.9	0.25	105.7	91.0
Std dev	0.70	299.5	0.09	39.3	1.2
% Std dev	11.3	11.3	26.7	26.7	1.3

Number of one-hour averages: 22
Percent coverage: 91.7

Daily Summary and Hourly Averages
April 10, 1981

Process Conditions

Average Boiler Load .... 66 mmBtu
Slurry pH 4.70
Adipic Acid concentration ... 2400 ppm

Scrubber Performance

Time	SO2 Inlet #/mmBtu	SO2 Inlet ng/J	SO2 Outlet #/mmBtu	SO2 Outlet ng/J	Eff %
00:00	7.92	3406.7	0.22	94.5	97.2
01:00	6.21	2671.8	0.08	36.5	98.6
02:00	6.50	2794.8	0.09	40.8	98.5
03:00	5.71	2453.4	0.11	47.7	98.1
04:00	5.65	2431.1	0.11	46.5	98.1
05:00	5.43	2335.7	0.10	44.4	98.1
06:00	5.27	2267.8	0.18	79.0	96.5
07:00	5.21	2239.1	0.24	105.1	95.3
08:00	5.39	2317.5	0.26	110.1	95.2
09:00	5.31	2283.0	0.21	91.1	96.0
10:00	4.98	2139.8	0.18	79.3	96.3
11:00	5.06	2176.5	0.20	83.9	96.1
12:00	5.07	2180.3	0.20	84.9	96.1
13:00	5.17	2223.3	0.13	56.3	97.5
14:00	4.41	1895.0	0.18	75.4	96.0
15:00	***	****	***	****	***
16:00	4.34	1867.9	0.33	141.7	92.4
17:00	4.53	1945.8	0.25	108.0	94.4
18:00	4.46	1919.1	0.16	67.3	96.5
19:00	4.35	1871.5	0.12	50.3	97.3
20:00	4.42	1899.7	0.10	42.8	97.7
21:00	4.47	1921.6	0.10	41.4	97.8
22:00	4.59	1975.0	0.11	48.3	97.6
23:00	4.67	2005.9	0.09	37.9	98.1
Mean	5.06	2174.5	0.16	70.5	96.8
Maximum	7.92	3406.7	0.33	141.7	98.6
Minimum	4.34	1867.9	0.08	36.5	92.4
Std dev	0.85	366.7	0.07	28.9	1.5
% Std dev	16.9	16.9	41.0	41.0	1.5

Number of one-hour averages: 23
Percent coverage: 95.8

10 Minute Averages
March 4, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	710	14.6	3.81	23	15.3	0.14
00:10	695	14.7	3.81	19	15.3	0.11
00:20	674	14.9	3.83	28	15.6	0.18
00:30	754	14.2	3.83	57	15.8	0.38
00:40	779	14.0	3.81	74	15.9	0.50
00:50	749	14.2	3.78	86	16.1	0.61
01:00	747	14.3	3.84	74	15.6	0.48
01:10	523	16.7	4.21	32	17.1	0.29
01:20	484	17.1	4.36	18	17.6	0.18
01:30	465	17.3	4.43	96	18.3	1.26
01:40	580	16.3	4.24	73	17.1	0.64
01:50	723	14.7	3.95	65	16.6	0.51
02:00	710	14.8	3.92	118	17.0	1.02
02:10	738	14.6	4.00	69	16.3	0.51
02:20	677	15.1	3.93	77	15.8	0.51
02:30	717	14.8	3.99	57	15.8	0.38
02:40	697	14.9	3.95	66	16.2	0.47
02:50	736	14.5	3.92	76	16.0	0.52
03:00	711	14.7	3.91	80	16.0	0.56
03:10	685	15.0	3.92	95	17.3	0.91
03:20	669	15.2	3.98	103	17.3	0.96
03:30	661	15.4	4.06	115	17.5	1.13
03:40	650	15.5	4.07	115	17.5	1.16
03:50	625	15.6	4.03	115	17.4	1.10
04:00	616	15.9	4.14	144	17.5	1.46
04:10	599	15.9	4.03	121	17.9	1.35
04:20	632	15.4	3.91	105	17.8	1.16
04:30	652	15.2	3.88	125	17.2	1.14
04:40	639	15.3	3.89	117	17.5	1.16
04:50	688	14.9	3.89	104	17.0	0.91
05:00	679	15.0	3.88	120	17.1	1.07
05:10	647	15.2	3.88	113	17.4	1.09
05:20	717	14.7	3.90	142	16.6	1.13
05:30	756	14.3	3.87	133	16.2	0.96
05:40	714	14.7	3.90	135	16.3	0.99
05:50	728	14.5	3.88	144	16.2	1.04
06:00	714	14.6	3.86	141	16.2	1.01
06:10	773	14.0	3.80	153	15.5	0.95
06:20	770	14.0	3.81	139	16.0	0.97
06:30	736	14.4	3.82	143	15.6	0.92
06:40	765	14.2	3.85	137	15.7	0.90
06:50	781	14.0	3.86	126	15.8	0.84
07:00	748	14.3	3.86	152	16.0	1.04
07:20	718	14.5	3.77	105	18.3	1.37
07:30	699	14.7	3.83	23	15.3	0.14
07:40	760	14.9	4.28	17	17.3	0.16
07:50	764	14.9	4.29	30	14.9	0.17
08:00	744	14.9	4.23	31	14.8	0.17
08:10	745	14.9	4.20	35	14.5	0.18
08:20	811	14.2	4.10	48	13.8	0.23
08:30	844	13.9	4.08	44	13.9	0.21
08:40	813	14.1	4.07	39	14.3	0.20
08:50	744	14.7	4.08	39	14.1	0.20
09:20	857	15.0	4.92	39	14.9	0.22
09:30	859	15.1	5.05	226	17.3	2.13
09:40	797	15.6	5.10	54	15.0	0.31
09:50	698	14.8	3.89	44	13.8	0.21
10:00	847	14.2	4.27	51	13.5	0.24
10:10	802	14.7	4.40	44	14.3	0.23

continued

10 Minute Averages Continued March 4, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
10:20	818	14.8	4.53	41	14.5	0.22
10:30	796	14.9	4.47	38	14.4	0.20
10:40	763	15.0	4.38	42	14.0	0.21
10:50	812	14.4	4.26	40	14.0	0.20
11:00	765	15.0	4.41	34	14.4	0.18
11:10	755	15.1	4.45	31	14.9	0.18
11:20	702	15.5	4.45	29	14.9	0.16
11:30	750	15.1	4.35	29	14.4	0.15
11:40	782	14.8	4.35	30	14.5	0.16
11:50	749	15.2	4.48	26	15.0	0.15
12:00	688	15.9	4.64	21	15.6	0.13
12:10	629	16.1	4.41	19	15.4	0.12
12:20	676	15.6	4.37	22	14.9	0.12
12:30	699	15.3	4.21	26	14.3	0.14
12:40	723	15.0	4.12	26	14.4	0.14
12:50	735	15.0	4.25	28	14.3	0.15
13:00	689	15.3	4.19	24	14.7	0.13
13:10	763	14.8	4.23	29	14.0	0.14
13:20	796	14.4	4.13	37	13.5	0.17
13:30	822	14.2	4.14	35	13.8	0.16
13:40	753	14.7	4.13	29	14.2	0.15
13:50	742	14.9	4.21	28	14.3	0.14
14:00	767	14.6	4.12	29	13.6	0.13
14:10	759	14.6	4.06	32	13.5	0.15
14:20	769	14.6	4.11	35	13.9	0.17
14:30	778	14.6	4.19	32	13.9	0.16
14:40	734	15.2	4.36	26	14.2	0.13
14:50	762	14.6	4.12	29	13.9	0.14
15:00	792	14.7	4.30	35	13.7	0.16
15:10	722	15.0	4.14	25	14.1	0.12
15:20	679	15.3	4.11	22	14.4	0.12
15:30	680	15.2	4.04	24	14.0	0.12
15:40	721	14.8	4.02	26	13.9	0.13
15:50	677	15.3	4.09	25	14.0	0.12
16:00	688	15.2	4.07	24	14.2	0.12
16:10	685	15.1	3.98	20	14.0	0.10
16:20	699	15.0	4.03	24	13.9	0.12
16:30	712	14.9	4.00	28	13.5	0.13
16:40	681	15.0	3.88	25	13.6	0.12
16:50	709	14.8	3.93	23	14.0	0.11
17:00	690	15.2	4.10	22	14.1	0.11
17:10	678	14.9	3.82	23	13.9	0.11
17:20	772	14.0	3.79	24	13.8	0.11
17:30	671	14.8	3.74	21	14.1	0.10
17:40	705	14.6	3.81	20	14.3	0.10
17:50	629	15.3	3.81	22	14.2	0.11
18:00	693	14.6	3.73	24	14.0	0.12
18:10	647	15.1	3.79	23	14.3	0.12
18:20	624	15.4	3.84	21	14.8	0.11
18:30	633	15.3	3.81	22	14.9	0.12
18:40	619	15.5	3.89	20	15.0	0.11
18:50	572	15.8	3.79	19	14.6	0.10
19:00	647	15.1	3.77	26	14.2	0.13
19:10	657	15.0	3.77	23	14.6	0.12
19:20	660	15.2	3.90	26	14.3	0.13
19:30	711	14.5	3.78	29	13.9	0.14
19:40	725	14.3	3.72	31	13.8	0.15
19:50	633	15.1	3.67	25	14.3	0.13
20:00	672	14.8	3.71	25	14.4	0.13
20:10	629	15.2	3.74	22	14.8	0.12
20:20	662	14.9	3.76	25	14.4	0.13
20:30	644	15.0	3.73	24	14.0	0.12

continued

10 Minute Averages Continued March 4, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
20:40	687	14.8	3.79	29	13.5	0.13
20:50	715	14.4	3.72	31	13.8	0.15
21:00	715	14.7	3.91	31	13.4	0.14
21:10	688	14.6	3.71	31	13.6	0.14
21:20	675	14.8	3.77	25	13.9	0.12
21:30	653	15.2	3.90	26	14.0	0.13
21:40	674	15.0	3.86	30	13.5	0.14
21:50	696	14.7	3.79	29	13.7	0.14
22:00	673	15.0	3.87	27	14.0	0.13
22:10	663	15.1	3.86	27	13.9	0.13
22:20	643	15.1	3.79	30	13.9	0.14
22:30	646	15.2	3.82	25	14.1	0.13
22:40	660	15.0	3.78	28	13.6	0.13
22:50	683	14.7	3.72	30	13.4	0.13
23:00	704	14.4	3.68	29	13.3	0.13
23:10	679	14.7	3.70	27	13.6	0.13
23:20	623	15.2	3.70	24	13.8	0.11
23:30	658	14.7	3.60	29	13.4	0.13
23:40	666	14.6	3.57	28	13.4	0.13
23:50	666	14.4	3.50	28	13.5	0.13

10 Minute Averages
March 5, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	667	14.7	3.62	27	13.5	0.12
00:10	632	14.9	3.57	24	13.9	0.12
00:20	622	15.0	3.58	26	14.0	0.13
00:30	579	15.5	3.61	23	14.3	0.12
00:40	629	15.0	3.64	22	14.2	0.11
00:50	573	15.4	3.57	20	14.3	0.11
01:00	589	15.2	3.52	22	14.2	0.11
01:10	614	15.1	3.58	23	14.1	0.11
01:20	585	15.3	3.55	21	14.1	0.11
01:30	518	15.4	3.17	18	14.4	0.09
01:40	587	15.0	3.38	20	14.2	0.10
01:50	582	14.9	3.29	21	14.1	0.11
02:00	600	15.0	3.43	19	14.3	0.10
02:10	611	14.9	3.48	18	14.2	0.09
02:20	548	15.4	3.38	18	14.5	0.09
02:30	546	15.6	3.49	18	14.3	0.09
02:40	517	15.3	3.11	16	14.3	0.08
02:50	552	15.4	3.38	17	14.2	0.09
03:00	518	15.1	3.03	17	14.3	0.09
03:10	557	15.2	3.32	16	14.5	0.08
03:20	535	15.3	3.23	17	14.6	0.09
03:30	516	15.6	3.31	14	15.1	0.08
03:40	498	15.7	3.24	16	14.7	0.09
03:50	549	15.2	3.25	18	14.4	0.09
04:00	545	15.2	3.27	17	14.7	0.09
04:10	526	15.4	3.26	19	14.4	0.10
04:20	521	15.5	3.25	17	14.8	0.09
04:30	547	15.2	3.24	19	14.6	0.10
04:40	529	15.4	3.24	18	14.5	0.10
04:50	557	15.1	3.27	17	14.5	0.09
05:00	522	15.4	3.24	17	14.8	0.09
05:10	525	15.4	3.22	20	14.4	0.10
05:20	457	16.3	3.40	16	14.8	0.09
05:30	605	14.6	3.24	21	14.2	0.11
05:40	583	14.7	3.20	21	14.3	0.11
05:50	573	15.0	3.30	21	14.3	0.11
06:00	588	14.8	3.26	24	14.1	0.12
06:10	578	14.8	3.19	23	14.2	0.12
06:20	569	14.7	3.13	23	14.0	0.11
06:30	614	14.2	3.12	27	13.5	0.13
06:40	621	14.1	3.11	28	13.4	0.13
06:50	636	14.0	3.15	30	13.4	0.14
07:00	644	14.1	3.19	29	13.5	0.14
07:10	629	14.2	3.20	30	13.6	0.14
07:20	616	14.4	3.20	32	13.5	0.15
07:30	632	14.3	3.23	27	13.6	0.13
10:00	530	12.3	2.08	34	12.3	0.13
10:10	365	13.3	1.63	36	12.9	0.15
10:20	558	13.4	2.52	33	13.0	0.14
10:30	531	13.0	2.29	38	12.6	0.16
12:30	169	17.1	1.52	39	14.5	0.20
12:40	375	15.0	2.16	42	14.6	0.23
12:50	400	16.4	2.99	37	14.7	0.20
13:00	538	17.3	5.03	32	14.5	0.17
13:10	514	16.6	4.02	28	13.8	0.13
13:20	514	16.0	3.57	25	14.1	0.13
13:30	342	16.5	2.66	35	13.0	0.15
13:40	543	16.2	3.92	33	13.7	0.15
13:50	523	15.9	3.55	32	12.8	0.14

continued

10 Minute Averages Continued March 5, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
14:00	610	15.0	3.51	53	11.9	0.20
14:10	550	15.4	3.38	37	13.1	0.16
14:20	113	21.6	****	29	13.4	0.13
14:30	579	14.9	3.28	33	13.3	0.15
14:40	547	16.0	3.79	32	13.7	0.15
14:50	461	16.3	3.40	37	13.1	0.16
15:00	7	14.9	0.04	31	13.3	0.14
15:10	661	14.0	3.24	30	13.2	0.13
15:20	628	14.1	3.12	38	12.5	0.15
15:30	586	12.9	2.49	37	12.3	0.15
15:40	641	12.9	2.71	43	12.1	0.17
15:50	676	12.4	2.69	41	12.1	0.16
16:00	627	12.9	2.65	36	12.5	0.14
16:10	622	12.6	2.55	40	12.2	0.15
16:20	585	13.0	2.52	32	12.9	0.14
17:00	565	12.3	2.22	***	18.6	****
17:10	484	12.4	1.92	23	12.2	0.09
17:20	546	12.3	2.16	20	12.4	0.08
17:30	478	13.4	2.16	18	12.7	0.07
17:50	449	13.2	1.97	28	12.7	0.12
18:00	503	13.1	2.17	31	13.3	0.14
18:10	439	14.0	2.15	33	13.2	0.14
18:30	551	13.8	2.62	39	12.8	0.16
18:50	406	12.7	1.67	29	13.7	0.13
19:00	298	16.6	2.34	31	14.6	0.17
19:10	225	12.9	0.95	48	13.2	0.21
19:20	138	18.4	1.88	28	15.0	0.16
19:30	161	15.7	1.05	31	15.0	0.18
19:40	118	15.7	0.77	34	14.9	0.19
20:50	413	18.3	5.43	***	16.3	****
21:00	591	16.3	4.36	***	16.8	****
21:10	477	17.1	4.23	***	17.4	****
21:20	449	18.8	7.26	15	17.0	0.14
21:30	1003	14.9	5.62	14	14.9	0.08
21:40	660	14.7	3.63	35	13.1	0.15
21:50	562	15.4	3.46	23	14.7	0.12
22:00	632	14.5	3.35	33	13.5	0.15
22:10	673	14.0	3.32	39	13.6	0.18
22:20	993	12.1	3.84	71	12.0	0.27
22:30	797	13.1	3.46	47	13.0	0.20
22:40	786	13.8	3.76	42	13.7	0.20
22:50	826	12.9	3.50	54	12.0	0.21
23:00	751	13.5	3.44	48	13.3	0.22
23:10	751	13.7	3.56	50	13.5	0.23
23:20	796	13.4	3.62	56	12.8	0.23
23:30	824	13.2	3.64	67	12.4	0.27
23:40	946	12.4	3.76	77	12.0	0.29
23:50	836	13.4	3.79	59	13.2	0.26

10 Minute Averages
March 6, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	842	13.7	3.98	47	13.7	0.22
00:10	796	14.4	4.16	41	14.0	0.20
00:20	792	14.5	4.21	41	14.1	0.21
00:30	768	15.1	4.50	36	14.6	0.20
00:40	748	15.2	4.47	41	14.8	0.23
00:50	795	15.0	4.55	48	14.4	0.25
01:00	812	15.0	4.65	48	14.5	0.25
01:10	798	15.1	4.67	39	15.1	0.23
01:20	726	15.7	4.77	34	15.4	0.21
01:30	713	15.9	4.89	38	15.1	0.22
01:40	760	15.5	4.78	43	14.7	0.24
01:50	845	14.9	4.74	46	14.7	0.25
02:00	807	15.3	4.87	50	14.7	0.28
02:10	817	15.0	4.73	44	15.2	0.26
02:20	741	15.9	5.05	43	15.2	0.25
02:30	805	15.3	4.91	56	14.7	0.31
02:40	834	15.1	4.87	52	14.9	0.29
02:50	813	15.4	5.03	52	15.1	0.30
03:00	847	15.2	5.05	60	14.8	0.33
03:10	858	15.0	4.91	64	14.5	0.34
03:20	899	14.6	4.85	66	13.9	0.32
03:30	864	14.8	4.82	61	14.3	0.31
03:40	844	15.0	4.87	53	15.0	0.30
03:50	788	15.4	4.87	49	15.1	0.29
04:00	826	15.0	4.76	46	15.1	0.27
04:10	773	15.5	4.84	51	14.9	0.29
04:20	812	15.2	4.84	51	15.1	0.30
04:30	779	15.5	4.92	50	15.1	0.29
04:40	772	15.5	4.81	51	14.7	0.28
04:50	768	15.4	4.71	41	15.2	0.24
05:00	699	15.9	4.79	38	15.4	0.24
05:10	693	15.7	4.54	37	15.0	0.22
05:20	633	16.3	4.67	26	15.6	0.17
05:30	595	16.8	4.88	33	15.8	0.22
05:40	579	16.9	4.88	31	16.1	0.22
05:50	609	16.5	4.68	31	15.8	0.21
06:00	679	15.7	4.41	42	15.0	0.24
06:10	748	14.8	4.16	54	13.7	0.26
06:20	874	13.3	3.88	36	12.9	0.15
06:30	811	14.0	3.98	21	13.3	0.09
06:40	820	13.7	3.88	28	13.2	0.12
06:50	863	15.0	4.96	27	14.7	0.15
07:00	874	14.9	4.94	15	14.7	0.08
07:10	814	15.3	4.93	20	14.9	0.11
07:20	819	15.4	5.05	25	14.8	0.14
07:30	901	14.8	5.01	24	14.7	0.13
07:40	830	15.0	4.77	31	14.6	0.17
07:50	814	15.4	5.02	14	14.8	0.08
08:00	836	14.6	4.50	15	14.0	0.07
08:10	1049	14.2	5.31	65	14.1	0.33
08:20	1360	13.3	6.07	81	12.4	0.32
08:30	1278	12.2	4.98	75	13.0	0.32
08:40	1229	13.3	5.48	67	12.7	0.28
08:50	1092	11.6	3.98	57	12.0	0.22
09:00	1006	11.9	3.77	88	11.6	0.32
09:40	913	12.5	3.70	67	13.2	0.29
10:10	874	15.1	5.11	56	15.6	0.36
10:20	847	16.3	6.24	64	15.1	0.37
10:50	866	13.4	3.91	49	13.5	0.23

continued

10 Minute Averages Continued   March 6, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
11:00	778	14.1	3.85	45	13.7	0.21
11:10	839	13.5	3.85	51	13.3	0.23
11:20	873	13.1	3.82	61	13.0	0.26
11:30	892	13.1	3.85	51	13.3	0.23
11:40	934	14.8	5.28	56	14.9	0.31
11:50	830	14.9	4.69	61	15.0	0.35
12:50	750	14.1	3.74	28	13.8	0.13
13:10	776	13.4	3.50	25	13.5	0.11
13:20	1059	11.5	3.83	51	11.6	0.19
13:30	984	11.6	3.58	78	11.8	0.29
13:40	860	12.6	3.53	52	12.6	0.21
13:50	952	12.1	3.66	70	11.8	0.26
14:00	1005	11.7	3.71	65	12.4	0.26
14:10	894	12.7	3.71	70	12.4	0.28
14:20	947	12.3	3.75	57	12.5	0.23
14:30	979	12.0	3.72	67	12.0	0.26
14:40	959	12.0	3.66	67	12.5	0.27
14:50	919	12.5	3.70	68	12.5	0.27
15:00	855	12.9	3.63	54	13.0	0.23
15:10	858	12.9	3.66	54	12.9	0.23
15:20	792	13.5	3.62	37	13.6	0.17
15:30	916	12.5	3.69	63	12.5	0.26
15:40	953	12.1	3.69	66	12.3	0.26
15:50	770	13.6	3.57	33	14.0	0.17
16:00	720	14.2	3.63	25	14.4	0.13
16:10	884	12.9	3.76	76	12.0	0.29
16:20	776	13.6	3.61	30	13.8	0.14
16:30	804	13.2	3.56	38	13.2	0.17
16:40	863	12.7	3.56	49	12.6	0.20
16:50	866	12.6	3.55	46	12.8	0.19
17:00	815	12.9	3.46	44	13.1	0.19
17:10	768	13.5	3.50	38	13.0	0.16
17:20	794	13.3	3.53	52	12.6	0.21
17:30	878	12.5	3.56	55	12.5	0.22
17:40	981	12.0	3.72	71	12.1	0.27
17:50	903	12.5	3.64	60	12.4	0.24
18:00	882	12.6	3.61	48	12.8	0.20
18:10	916	12.4	3.66	65	12.4	0.26
18:20	941	12.4	3.76	66	12.4	0.26
18:30	870	12.9	3.70	59	12.8	0.25
18:40	916	12.7	3.77	53	12.7	0.22
18:50	922	12.7	3.80	50	12.8	0.21
19:00	937	12.6	3.81	52	12.8	0.22
19:10	910	12.7	3.77	63	12.5	0.26
19:20	928	12.5	3.74	67	12.4	0.27
19:30	873	13.0	3.76	49	13.4	0.22
19:40	905	12.8	3.81	56	13.1	0.24
19:50	823	13.5	3.77	51	13.3	0.23
20:00	847	13.4	3.81	62	13.1	0.27
20:10	830	12.7	3.85	61	12.8	0.25
20:20	947	12.6	3.85	71	12.4	0.28
20:30	982	12.3	3.89	67	12.3	0.26
20:40	954	12.5	3.85	69	12.8	0.29
20:50	857	13.4	3.87	61	13.2	0.27
21:00	925	12.8	3.86	80	12.4	0.32
21:10	1021	11.9	3.84	85	12.2	0.33
21:20	936	12.6	3.84	70	12.7	0.29
21:30	917	12.9	3.88	68	13.0	0.29
21:40	898	13.1	3.90	64	12.9	0.27
21:50	902	13.1	3.90	61	12.9	0.26
22:00	918	12.9	3.89	65	13.0	0.28
22:10	907	12.9	3.86	60	13.2	0.26

continued

10 Minute Averages Continued March 6, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
22:20	883	13.0	3.80	63	13.0	0.27
22:30	880	13.1	3.83	59	13.1	0.26
22:40	843	13.4	3.80	50	13.4	0.23
22:50	805	13.6	3.75	47	13.6	0.22
23:00	754	14.1	3.76	41	14.0	0.20
23:10	814	13.6	3.77	47	13.4	0.21
23:20	781	13.9	3.82	39	14.0	0.19
23:30	765	14.1	3.80	38	13.9	0.18
23:40	843	13.3	3.75	46	13.6	0.22
23:50	775	14.0	3.80	45	13.6	0.21

10 Minute Averages
March 7, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	741	13.9	3.61	52	14.0	0.26
00:10	755	13.9	3.66	52	14.0	0.25
00:20	714	14.3	3.64	51	14.0	0.25
00:30	709	14.2	3.61	47	14.1	0.24
00:40	663	14.7	3.62	41	14.6	0.22
00:50	672	14.5	3.54	39	14.3	0.20
01:00	704	14.3	3.59	46	14.0	0.23
01:10	656	14.8	3.65	47	13.9	0.23
01:20	795	13.5	3.67	63	13.2	0.28
01:30	799	13.4	3.62	58	13.8	0.28
01:40	777	13.6	3.64	62	13.3	0.27
01:50	775	13.4	3.51	53	13.9	0.26
02:00	832	12.6	3.39	61	13.1	0.27
02:10	786	13.4	3.53	62	13.5	0.28
02:20	827	13.2	3.66	75	13.0	0.32
02:30	838	13.2	3.70	61	13.5	0.28
02:40	871	12.9	3.71	68	13.1	0.30
02:50	863	13.0	3.70	68	13.2	0.30
03:00	844	13.0	3.64	66	13.4	0.30
03:10	690	14.5	3.66	57	14.0	0.28
03:20	751	14.2	3.81	56	14.2	0.29
03:30	736	14.5	3.87	49	14.4	0.25
03:40	765	14.2	3.88	55	14.2	0.28
03:50	742	14.3	3.82	57	14.2	0.29
04:00	750	14.3	3.85	70	13.3	0.31
04:10	887	13.1	3.86	69	13.3	0.31
04:20	872	13.2	3.86	68	13.4	0.31
04:30	858	13.4	3.88	67	13.8	0.32
04:40	855	13.5	3.92	69	13.5	0.32
04:50	859	13.4	3.88	75	13.3	0.33
05:00	894	13.0	3.84	75	13.3	0.34
05:10	841	13.5	3.87	70	13.5	0.32
05:20	870	13.2	3.84	104	11.9	0.39
05:30	1047	11.6	3.84	118	11.6	0.43
05:40	1024	11.7	3.79	118	11.6	0.43
05:50	1044	11.6	3.80	113	11.7	0.42
06:00	1013	11.8	3.80	105	12.0	0.40
06:10	997	11.9	3.77	108	12.1	0.42
06:20	999	11.9	3.77	114	11.7	0.42
06:30	1010	11.8	3.78	110	12.0	0.42
06:40	972	12.2	3.79	104	12.0	0.40
06:50	996	11.9	3.75	119	11.6	0.44
07:00	1001	11.8	3.73	101	12.1	0.39
07:10	945	12.3	3.74	91	12.5	0.37
07:20	910	12.7	3.75	84	12.7	0.35
07:30	887	12.8	3.73	84	12.9	0.36
07:40	910	12.6	3.73	102	12.3	0.40
07:50	984	12.0	3.73	113	11.8	0.42
08:00	997	11.9	3.74	117	11.7	0.43
08:10	998	11.8	3.72	119	11.6	0.43
08:20	999	11.7	3.68	110	11.8	0.41
08:30	1030	11.5	3.73	103	11.9	0.39
08:40	1028	11.6	3.75	101	12.1	0.39
08:50	961	12.2	3.73	98	12.3	0.39
09:30	1013	11.5	3.66	125	11.1	0.43
09:40	1079	11.2	3.77	123	10.6	0.40
09:50	1089	11.2	3.80	125	11.1	0.43
10:00	1041	11.5	3.77	108	11.6	0.39
10:30	926	12.7	3.82	73	12.6	0.30

continued

10 Minute Averages Continued March 7, 1981

Start of 10 Minute Period	Scrubber Inlet			Scrubber Outlet		
	SO2 ppm	O2 %	E #/mmBtu	SO2 ppm	O2 %	E #/mmBtu
10:40	909	13.2	4.00	41	16.9	0.35
10:50	890	13.3	3.99	46	16.9	0.39
11:00	919	13.2	4.06	40	17.2	0.37
11:10	868	13.6	4.04	47	16.8	0.39
11:20	913	13.3	4.06	52	16.4	0.39
11:30	943	12.9	3.99	50	16.6	0.39
11:40	893	13.2	3.91	46	16.5	0.35
11:50	884	13.4	4.01	42	16.8	0.35
12:10	1001	12.0	3.81	100	12.1	0.38
12:20	1044	11.7	3.85	108	11.7	0.40
12:30	1119	11.4	3.99	120	11.3	0.42
12:40	956	12.6	3.91	77	12.8	0.32
12:50	907	13.2	3.98	69	13.3	0.31
13:00	936	12.9	3.97	81	12.8	0.34
13:10	1020	12.3	4.03	98	12.1	0.38
13:20	1049	12.1	4.04	100	11.9	0.38
13:30	1082	11.9	4.07	104	11.9	0.39
13:40	1102	11.7	4.05	108	11.7	0.40
13:50	1069	11.8	3.98	92	12.0	0.35
14:00	1027	12.1	3.97	88	12.3	0.35
14:10	1022	12.2	4.00	87	12.5	0.35
14:20	1048	12.1	4.05	82	12.3	0.32
14:30	1037	12.0	3.94	81	12.1	0.31
14:40	1067	11.8	3.97	86	11.7	0.32
14:50	1102	11.4	3.94	103	11.3	0.36
15:00	1011	12.0	3.87	59	13.2	0.26
15:10	845	13.8	4.02	48	13.2	0.21
15:20	934	12.8	3.90	51	13.1	0.22
15:30	929	12.9	3.93	51	12.9	0.21
15:40	929	12.8	3.87	56	12.7	0.23
15:50	950	12.5	3.84	46	13.1	0.20
16:00	851	13.4	3.83	37	13.7	0.17
16:10	841	13.4	3.80	35	13.6	0.16
16:20	867	13.4	3.91	43	13.5	0.20
16:30	896	13.1	3.89	49	13.1	0.21
16:40	904	13.0	3.87	55	12.5	0.22
16:50	990	12.2	3.86	55	12.7	0.23
17:00	946	12.5	3.82	44	13.3	0.20
17:10	864	13.1	3.76	42	13.0	0.18
17:20	889	12.9	3.75	44	12.9	0.19
17:30	894	12.9	3.78	44	13.0	0.19
17:40	859	13.3	3.81	49	13.3	0.22
17:50	848	13.5	3.89	40	13.4	0.18
18:00	929	12.7	3.85	53	12.6	0.22
18:10	950	12.5	3.85	52	12.8	0.22
18:20	979	12.3	3.88	54	12.5	0.22
18:30	911	12.9	3.84	48	13.1	0.21
18:40	875	13.2	3.84	40	13.2	0.18
18:50	886	13.1	3.84	43	13.0	0.19
19:00	890	12.9	3.79	47	13.1	0.20
19:10	896	12.8	3.74	44	13.2	0.19
19:20	819	13.5	3.74	36	13.5	0.16
19:30	933	12.6	3.82	51	12.6	0.21
19:40	947	12.5	3.82	53	12.4	0.21
19:50	934	12.6	3.79	53	12.6	0.22
20:00	971	12.2	3.78	54	12.3	0.21
20:10	945	12.6	3.85	49	12.8	0.20
20:20	972	12.4	3.90	54	12.4	0.22
20:30	900	13.0	3.85	48	13.0	0.21
20:40	880	13.1	3.84	52	13.0	0.22
20:50	949	12.8	3.97	62	12.7	0.25
21:00	1007	12.6	4.13	72	12.7	0.30

continued

10 Minute Averages Continued March 7, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
21:10	998	12.7	4.12	76	12.6	0.31
21:20	1032	12.6	4.19	80	12.8	0.33
21:30	906	13.0	3.91	62	13.2	0.27
21:40	912	12.8	3.82	56	12.9	0.24
21:50	871	13.0	3.75	76	13.4	0.34
22:00	880	12.9	3.71	52	13.3	0.23
22:10	839	13.4	3.78	49	13.4	0.22
22:20	857	13.2	3.77	53	13.0	0.23
22:30	857	13.2	3.79	52	13.1	0.23
22:40	839	13.3	3.73	54	12.7	0.22
22:50	911	12.6	3.70	52	12.6	0.21
23:00	941	12.3	3.70	90	12.5	0.37
23:10	876	12.8	3.65	124	12.7	0.51
23:20	949	12.2	3.70	70	12.2	0.27
23:30	954	12.1	3.69	77	12.0	0.28
23:40	1002	11.9	3.76	84	11.7	0.31
23:50	979	11.9	3.69	70	12.6	0.28

10 Minute Averages
March 8, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Sorubber Outlet SO2 ppm	Sorubber Outlet O2 %	Sorubber Outlet E #/mmBtu
00:00	859	12.9	3.62	55	13.0	0.24
00:10	865	13.0	3.70	53	13.3	0.24
00:20	833	13.2	3.68	55	13.6	0.25
00:30	840	13.2	3.69	187	13.4	0.84
00:40	860	13.0	3.71	163	13.2	0.72
00:50	878	12.8	3.66	54	12.8	0.23
01:00	890	12.6	3.64	57	12.8	0.24
01:10	816	13.3	3.63	43	13.6	0.20
01:20	826	13.6	3.83	51	13.2	0.23
01:30	912	12.7	3.75	57	12.9	0.24
01:40	952	12.6	3.87	68	12.8	0.28
01:50	964	12.5	3.90	61	12.4	0.25
02:00	857	13.1	3.75	207	14.0	1.03
02:10	713	14.4	3.73	178	14.4	0.93
02:20	788	13.8	3.76	158	13.8	0.76
02:30	842	13.5	3.85	54	13.6	0.25
02:40	882	13.1	3.85	55	13.0	0.24
02:50	902	13.0	3.85	58	13.2	0.26
03:00	883	12.9	3.76	58	13.2	0.26
03:10	889	13.0	3.83	62	13.4	0.28
03:20	863	13.2	3.78	76	13.3	0.34
03:30	928	12.6	3.80	162	12.8	0.68
03:40	975	12.4	3.90	219	12.7	0.91
03:50	902	12.9	3.80	103	13.7	0.48
04:00	832	13.4	3.77	70	14.0	0.34
04:10	766	14.0	3.77	77	14.4	0.40
04:20	836	13.4	3.79	83	13.7	0.39
04:30	861	13.2	3.79	104	13.5	0.47
04:40	898	12.9	3.80	162	13.3	0.72
04:50	894	12.9	3.77	262	13.8	1.26
10:00	871	13.0	3.76	437	17.3	4.09
10:10	861	13.2	3.78	62	13.3	0.28
10:20	812	13.3	3.64	57	13.6	0.27
10:30	823	13.5	3.79	52	12.7	0.22
10:40	874	13.0	3.77	63	12.7	0.26
10:50	804	14.8	4.47	71	14.2	0.36
11:00	864	14.3	4.44	73	13.9	0.35
11:10	837	13.9	4.05	73	13.7	0.34
11:30	818	13.0	3.94	88	13.0	0.38
11:40	950	12.5	3.84	84	12.0	0.32
11:50	976	20.2	50.57	35	20.6	3.48
12:00	977	13.1	4.25	82	12.8	0.34
12:10	966	13.2	4.23	95	13.1	0.41
12:20	968	13.1	4.21	105	12.5	0.42
12:30	968	13.3	4.32	92	13.1	0.40
12:40	986	13.0	4.22	99	12.8	0.41
12:50	1075	15.1	6.28	104	15.0	0.60
13:00	842	13.8	4.00	68	14.0	0.33
13:10	847	14.0	4.17	64	13.9	0.31
13:20	873	13.8	4.16	69	13.8	0.33
13:30	953	13.2	4.21	100	12.8	0.42
13:40	910	15.6	5.83	63	15.6	0.40
13:50	973	15.5	6.11	66	15.5	0.41
14:00	921	13.3	4.12	92	13.5	0.42
14:10	757	14.7	4.15	64	13.9	0.31
14:20	943	13.2	4.16	93	12.7	0.38
14:30	955	13.0	4.09	83	12.8	0.35
14:40	931	14.3	4.79	73	14.3	0.38
14:50	910	14.5	4.82	63	14.5	0.33

continued

10 Minute Averages Continued March 8, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
15:10	925	12.9	3.93	64	12.9	0.27
15:20	905	13.5	4.13	59	13.2	0.26
15:30	969	13.1	4.21	67	12.7	0.28
15:40	946	13.2	4.16	67	12.9	0.28
15:50	907	13.4	4.10	59	13.3	0.26
16:00	877	13.7	4.14	59	13.5	0.27
16:10	917	13.5	4.18	50	13.7	0.24
16:20	831	14.2	4.20	58	13.8	0.28
16:30	869	13.8	4.17	56	13.7	0.27
16:40	860	13.9	4.14	66	13.7	0.31
16:50	880	13.7	4.16	52	13.8	0.25
17:00	915	13.3	4.11	58	13.3	0.26
17:10	924	13.3	4.12	57	13.3	0.25
17:20	873	13.7	4.09	52	13.4	0.24
17:30	866	13.7	4.09	52	13.4	0.23
17:40	765	14.7	4.17	32	14.5	0.17
17:50	831	14.2	4.21	52	14.0	0.26
18:00	911	13.5	4.19	62	13.2	0.27
18:10	914	13.4	4.16	74	13.3	0.33
18:20	845	13.9	4.08	60	14.1	0.30
18:30	816	14.3	4.18	45	13.8	0.21
18:40	858	13.9	4.14	46	13.9	0.22
18:50	825	14.1	4.09	47	13.5	0.22
19:00	841	14.0	4.12	42	13.7	0.20
19:10	796	14.3	4.07	56	14.1	0.28
19:20	792	14.4	4.15	46	14.6	0.24
19:30	739	14.9	4.18	48	14.5	0.26
19:40	778	14.5	4.14	58	14.1	0.29
19:50	957	13.2	4.23	58	13.1	0.25
20:00	892	13.6	4.14	54	13.3	0.24
20:10	893	13.7	4.19	50	13.6	0.23
20:20	825	14.2	4.17	45	13.9	0.22
20:30	853	14.0	4.18	60	13.9	0.29
20:40	939	13.5	4.29	66	13.5	0.30
20:50	781	14.6	4.21	51	14.0	0.25
21:00	826	14.2	4.21	53	14.4	0.28
21:10	814	15.0	4.68	81	15.0	0.47
21:20	856	16.1	6.05	66	15.4	0.40
21:30	904	15.7	5.90	67	15.7	0.44
21:40	877	15.4	5.41	78	15.4	0.48
21:50	931	15.5	5.85	76	15.5	0.48
22:00	984	14.9	5.56	86	14.9	0.49
22:10	827	14.2	4.16	55	14.0	0.27
22:20	854	13.8	4.09	62	13.3	0.27
22:30	940	13.2	4.14	79	13.0	0.34
22:40	939	13.2	4.12	80	13.0	0.34
22:50	928	13.3	4.13	82	13.0	0.35
23:00	937	13.2	4.10	77	13.1	0.34
23:10	828	13.9	4.04	42	14.0	0.21
23:20	854	13.8	4.08	53	13.3	0.24
23:30	952	13.1	4.13	62	12.6	0.25
23:40	976	12.7	4.06	91	12.6	0.37
23:50	979	12.7	4.04	87	12.5	0.35

10 Minute Averages
March 9, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	1002	12.5	4.04	73	12.6	0.30
00:10	922	13.0	3.97	87	12.8	0.36
00:20	973	12.7	4.01	95	12.7	0.39
00:30	972	12.7	4.04	103	12.5	0.42
00:40	986	12.5	4.00	84	12.3	0.33
00:50	976	12.6	3.99	100	12.5	0.40
01:00	932	12.9	3.85	87	12.9	0.37
01:10	933	13.0	3.99	84	12.9	0.36
01:20	943	12.9	4.01	84	12.9	0.36
01:30	958	12.8	4.01	93	12.7	0.38
01:40	960	12.8	4.01	81	13.1	0.35
01:50	870	13.5	3.99	78	13.4	0.35
02:00	853	13.6	3.97	71	13.8	0.34
02:10	772	14.2	3.88	57	14.0	0.28
02:20	774	13.9	3.75	54	13.7	0.26
02:30	763	14.0	3.73	63	13.8	0.30
02:40	716	14.4	3.74	61	14.0	0.30
02:50	712	14.5	3.75	56	14.1	0.28
03:00	693	14.5	3.69	58	14.2	0.29
03:10	797	13.7	3.74	60	13.6	0.28
03:20	724	14.3	3.73	56	14.1	0.28
03:30	660	14.9	3.70	49	14.6	0.27
03:40	672	14.7	3.67	43	14.5	0.23
03:50	679	14.5	3.61	47	13.7	0.22
04:00	707	14.0	3.50	45	13.7	0.21
04:10	714	13.9	3.46	57	13.7	0.27
04:20	778	13.5	3.57	69	13.0	0.30
04:30	781	13.3	3.51	65	13.2	0.28
04:40	759	13.4	3.45	63	13.1	0.27
04:50	754	13.3	3.38	62	13.1	0.27
05:00	743	13.4	3.37	52	13.1	0.23
05:10	741	13.3	3.32	58	13.2	0.26
05:20	695	14.0	3.40	51	13.4	0.23
05:30	718	13.9	3.46	52	13.4	0.23
05:40	700	14.0	3.43	52	13.2	0.23
05:50	720	13.7	3.39	64	13.4	0.29
06:00	745	13.3	3.33	63	13.1	0.27
06:10	724	13.4	3.30	61	13.3	0.27
06:20	751	13.3	3.34	62	13.0	0.27
06:30	779	13.2	3.42	52	12.8	0.22
06:40	770	13.3	3.42	55	13.0	0.24
06:50	700	14.0	3.44	49	13.8	0.23
07:00	699	14.1	3.50	47	13.7	0.22
07:10	708	14.1	3.51	41	13.7	0.19
07:20	705	14.0	3.49	50	13.6	0.23
07:30	676	14.3	3.49	57	13.8	0.27
07:40	676	14.4	3.51	57	13.9	0.28
07:50	584	15.4	3.58	50	15.1	0.29
08:00	544	15.8	3.63	28	15.3	0.17
08:30	674	13.7	3.18	46	12.6	0.19
08:40	791	12.8	3.32	74	11.6	0.27
08:50	875	11.9	3.29	77	11.7	0.29
09:00	836	12.2	3.28	62	11.8	0.23
09:10	810	12.2	3.17	61	12.0	0.23
09:20	792	12.4	3.17	58	12.0	0.22
09:30	794	12.5	3.22	60	12.1	0.23
09:40	838	12.3	3.30	75	11.6	0.27
09:50	806	12.6	3.29	58	12.2	0.23
10:00	1017	15.7	6.63	75	15.4	0.46

continued

10 Minute Averages Continued March 9, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
10:10	963	15.8	6.41	91	15.5	0.57
10:20	897	15.9	6.09	72	15.3	0.44
10:30	939	15.8	6.25	74	15.2	0.44
10:40	963	15.4	5.94	24	15.2	0.14
10:50	981	14.9	5.55	73	14.9	0.42
11:00	970	15.4	5.98	85	15.2	0.51
14:50	1017	13.5	4.66	82	13.5	0.37
15:00	1005	14.0	4.94	29	14.0	0.14
15:10	1107	14.1	5.52	86	14.1	0.43
15:20	1149	14.3	5.90	97	14.4	0.50
15:30	1017	14.4	5.31	86	14.3	0.44
15:40	987	14.4	5.15	82	14.3	0.42
15:50	981	14.6	5.28	26	14.6	0.14
16:00	915	14.3	4.70	77	14.8	0.43
16:10	969	14.4	5.06	73	14.7	0.40
16:20	1009	14.2	5.11	75	14.2	0.38
16:30	928	14.3	4.77	75	14.2	0.38
16:40	969	14.7	5.30	85	14.7	0.46
16:50	86	14.9	0.49	69	14.4	0.36
17:00	849	14.2	4.30	31	14.2	0.16
17:10	909	14.6	4.90	38	14.2	0.19
17:20	921	14.1	4.60	91	14.2	0.46
17:30	889	14.2	4.50	43	14.2	0.22
17:40	891	14.2	4.51	41	14.1	0.21
17:50	873	14.3	4.48	40	14.3	0.21
18:00	873	14.5	4.63	40	14.0	0.20
18:10	933	15.9	6.33	43	13.9	0.21
18:20	939	13.9	4.55	49	13.9	0.24
18:30	942	14.0	4.63	48	14.1	0.24
18:40	927	13.9	4.49	46	13.9	0.22
18:50	987	13.8	4.72	46	13.9	0.22
19:00	1011	13.9	4.90	48	14.0	0.24
19:10	981	14.1	4.89	53	13.9	0.26
19:20	981	13.9	4.75	51	14.0	0.25
19:30	993	14.3	5.10	55	14.8	0.30
19:40	909	14.8	5.06	50	14.6	0.27
19:50	861	14.3	4.43	47	14.5	0.25
20:00	915	15.0	5.26	37	14.6	0.20
20:10	837	14.6	4.51	37	14.2	0.19
20:20	909	14.4	4.74	35	14.3	0.18
20:30	909	14.3	4.67	39	14.2	0.20
20:40	939	14.5	4.98	41	14.5	0.22
20:50	127	14.3	0.65	44	14.3	0.23
21:00	903	14.8	5.02	39	14.9	0.22
21:10	843	14.8	4.69	36	14.3	0.18
21:20	855	14.6	4.61	34	14.3	0.17
21:30	873	15.0	5.02	34	14.5	0.18
21:40	826	14.3	4.24	32	14.2	0.16
21:50	909	14.2	4.60	33	14.2	0.17
22:00	933	13.1	4.06	39	13.0	0.17
22:10	1119	13.3	4.99	42	13.4	0.19
22:20	1083	14.0	5.32	56	14.1	0.28
22:30	998	13.9	4.84	52	13.8	0.25
22:40	957	14.0	4.71	47	13.9	0.23
22:50	933	14.2	4.72	46	14.3	0.24
23:00	969	14.3	4.98	39	14.4	0.20
23:10	957	14.1	4.77	35	14.2	0.18
23:20	909	14.3	4.67	39	14.2	0.20
23:30	951	14.3	4.89	43	14.3	0.22
23:40	933	14.2	4.72	39	14.3	0.20
23:50	915	14.4	4.77	36	14.3	0.19

10 Minute Averages
March 10, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	921	14.3	4.73	15	14.3	0.08
00:10	835	15.1	4.89	19	14.9	0.11
00:20	829	15.0	4.77	12	15.0	0.07
00:30	793	14.9	4.48	12	14.8	0.07
02:00	866	15.2	5.15	27	15.1	0.16
02:10	866	15.0	4.98	28	15.1	0.16
02:20	921	15.3	5.58	40	15.2	0.24
02:30	854	15.7	5.57	41	15.1	0.24
02:40	927	15.6	5.93	41	15.4	0.25
02:50	829	14.9	4.69	35	14.5	0.19
03:00	988	15.2	5.88	37	15.2	0.22
03:10	896	15.3	5.43	55	15.3	0.33
03:20	890	15.4	5.49	40	15.4	0.25
03:30	884	15.4	5.45	33	15.4	0.21
03:40	903	15.4	5.57	25	15.6	0.16
03:50	1055	14.8	5.87	8	14.8	0.04
04:00	1055	14.9	5.96	20	14.9	0.11
04:10	1000	14.9	5.65	25	14.5	0.13
04:20	1189	14.2	6.02	48	14.3	0.24
04:30	1128	14.3	5.80	34	14.3	0.18
04:40	1134	14.2	5.74	25	14.2	0.13
04:50	1153	14.1	5.75	26	14.1	0.13
05:00	1232	14.1	6.14	29	14.3	0.15
05:10	1128	12.6	4.61	31	13.1	0.14
05:20	1628	14.3	8.37	30	15.3	0.18
05:30	1098	15.1	6.42	191	15.5	1.20
05:40	1037	14.3	5.33	66	14.5	0.35
05:50	1159	14.4	6.05	71	14.5	0.38
06:00	1134	14.0	5.58	73	14.3	0.37
06:10	1226	13.7	5.77	68	13.9	0.33
06:20	1232	13.8	5.88	75	13.7	0.35
06:30	1195	13.7	5.63	90	13.7	0.42
06:40	1238	14.1	6.17	78	14.2	0.40
06:50	1561	14.0	7.67	95	14.3	0.49
07:00	1019	14.0	5.01	155	14.3	0.80
07:10	1105	13.9	5.35	115	14.0	0.56
07:20	1105	13.8	5.28	109	13.8	0.52
07:30	1089	13.6	5.06	78	14.4	0.41
07:40	1121	13.7	5.28	78	13.7	0.37
07:50	1164	13.6	5.41	85	14.0	0.42
09:00	1100	13.8	5.25	87	13.8	0.42
09:10	1083	14.0	5.33	76	14.3	0.39
09:20	1083	14.6	5.83	76	14.7	0.41
09:30	970	14.5	5.14	76	14.8	0.42
09:40	970	14.2	4.91	65	14.6	0.35
09:50	970	14.6	5.22	68	14.6	0.37
10:00	970	14.3	4.99	54	14.3	0.28
10:10	1040	14.3	5.35	49	14.5	0.26
10:20	1003	14.5	5.31	47	14.5	0.25
10:30	1003	14.3	5.15	54	14.3	0.28
10:40	997	14.4	5.20	45	14.4	0.24
10:50	1019	14.6	5.48	60	14.5	0.32
11:50	755	14.6	4.04	57	14.9	0.33
12:00	727	14.5	3.82	58	14.8	0.32
12:10	735	14.5	3.87	57	14.6	0.30
12:20	734	14.4	3.82	62	14.6	0.33
12:30	733	14.4	3.81	59	14.6	0.31
12:40	736	14.3	3.76	60	14.6	0.32
13:10	866	14.2	4.37	45	15.0	0.26

continued

10 Minute Averages Continued March 10, 1981

Start of	Scrubber Inlet			Scrubber Outlet		
10 Minute Period	SO2 ppm	O2 %	E #/mmBtu	SO2 ppm	O2 %	E #/mmBtu
13:20	822	15.0	4.72	44	15.1	0.26
13:30	778	15.1	4.57	40	15.4	0.25
13:40	865	14.6	4.64	58	14.8	0.32
13:50	850	14.7	4.62	53	15.2	0.32
14:00	811	15.0	4.63	53	15.3	0.32
14:10	852	14.6	4.59	54	15.0	0.31
14:20	831	14.8	4.60	61	14.9	0.34
14:30	842	14.6	4.56	54	15.0	0.31
14:40	865	14.4	4.54	45	15.0	0.26
14:50	846	14.6	4.53	41	14.7	0.23
15:00	840	14.5	4.49	46	14.9	0.26
15:10	798	14.8	4.41	42	15.2	0.25
15:20	797	15.0	4.57	41	15.2	0.25
15:30	824	14.8	4.56	41	15.1	0.24
15:40	816	14.7	4.45	45	14.9	0.25
15:50	857	14.4	4.50	45	14.7	0.25
16:00	866	14.3	4.42	56	14.6	0.30
16:10	890	14.1	4.41	46	14.5	0.24
16:20	896	14.1	4.46	41	14.5	0.21
16:30	871	14.3	4.47	40	14.7	0.22
16:40	875	14.3	4.52	45	14.8	0.25
16:50	820	14.6	4.43	41	14.9	0.23
17:00	831	14.5	4.38	42	14.9	0.24
17:10	837	14.4	4.39	45	14.6	0.24
17:20	799	14.7	4.38	35	15.1	0.21
17:30	833	14.5	4.39	43	14.6	0.23
17:40	827	14.5	4.40	41	14.9	0.23
17:50	813	14.6	4.40	36	14.9	0.20
18:00	811	14.6	4.36	31	14.9	0.18
18:10	810	14.5	4.26	32	14.7	0.17
18:20	806	14.5	4.28	38	14.7	0.21
18:30	821	14.4	4.28	38	14.5	0.20
18:40	817	14.4	4.26	39	14.5	0.21
18:50	908	13.9	4.41	49	14.4	0.25
19:00	914	13.8	4.36	59	13.9	0.28
19:10	933	13.7	4.40	55	14.1	0.27
19:20	780	14.8	4.34	30	15.3	0.18
19:30	750	15.1	4.38	29	15.5	0.18
19:40	728	15.3	4.37	31	15.4	0.19
19:50	735	15.2	4.41	29	15.6	0.19
20:00	752	15.2	4.44	27	15.5	0.17
20:10	710	15.4	4.36	33	15.6	0.21
20:20	699	15.5	4.35	33	15.5	0.20
20:30	677	15.6	4.31	26	15.7	0.17
20:40	715	14.9	4.04	28	14.9	0.16
20:50	715	14.8	3.98	21	14.8	0.12
21:00	108	15.6	0.69	17	15.3	0.10
21:10	693	15.6	4.44	112	15.7	0.73
21:20	715	15.3	4.33	20	15.2	0.12
21:40	683	15.2	4.06	26	15.1	0.15
23:00	730	15.8	4.86	34	15.7	0.22
23:10	790	15.3	4.79	35	14.8	0.19
23:20	823	14.7	4.50	38	14.7	0.21
23:30	807	14.1	4.02	39	14.7	0.21
23:40	807	14.6	4.34	35	14.6	0.19
23:50	768	14.7	4.20	33	14.8	0.18

10 Minute Averages
March 11, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	O2 %	E #/mmBtu	Scrubber Outlet SO2 ppm	O2 %	E #/mmBtu
00:00	753	14.8	4.19	39	14.7	0.21
00:10	747	14.6	4.02	38	14.6	0.21
00:20	747	14.6	4.02	40	14.6	0.21
00:30	748	14.5	3.96	38	14.4	0.20
00:40	737	14.6	3.97	34	14.7	0.19
00:50	747	14.9	4.23	35	14.5	0.18
01:00	747	14.9	4.23	35	14.7	0.19
01:10	732	14.8	4.07	33	14.8	0.18
01:20	716	14.9	4.05	33	14.8	0.18
01:30	742	15.0	4.27	32	14.8	0.18
01:40	727	15.1	4.25	30	14.9	0.17
01:50	727	14.9	4.11	27	14.8	0.15
02:00	711	14.8	3.95	30	14.8	0.16
02:10	696	15.0	4.00	27	15.0	0.16
02:20	685	15.2	4.08	24	15.1	0.14
02:30	716	15.3	4.34	25	15.2	0.15
02:40	701	15.3	4.24	24	15.2	0.15
02:50	701	15.4	4.32	23	15.3	0.14
03:00	706	15.4	4.35	22	15.1	0.13
03:10	706	15.2	4.20	24	15.0	0.14
03:20	753	15.2	4.48	24	14.9	0.14
03:30	747	14.8	4.16	29	14.8	0.16
03:40	742	15.0	4.27	28	14.9	0.16
03:50	737	14.9	4.17	31	14.7	0.17
04:00	737	14.9	4.17	25	15.0	0.15
04:10	742	15.0	4.27	26	15.1	0.15
04:20	742	14.9	4.20	31	14.9	0.17
04:30	721	15.0	4.15	26	15.0	0.15
04:40	721	15.2	4.29	26	14.9	0.15
04:50	721	15.0	4.15	24	14.8	0.13
05:00	721	15.1	4.22	25	14.8	0.14
05:10	706	14.9	3.99	23	15.0	0.13
05:20	721	15.2	4.29	257	14.8	1.43
05:30	732	14.9	4.14	26	14.9	0.15
05:40	727	15.0	4.18	25	14.8	0.14
05:50	732	14.9	4.14	26	15.0	0.15
06:00	612	15.2	3.64	26	14.8	0.15
06:10	576	15.0	3.31	15	15.1	0.09
06:20	555	15.2	3.30	15	14.8	0.08
06:30	581	15.1	3.40	14	14.7	0.08
06:40	623	14.8	3.46	15	14.7	0.08
06:50	758	14.9	4.28	21	14.6	0.11
07:00	753	14.8	4.18	28	14.7	0.16
07:10	706	15.3	4.27	32	15.5	0.20
07:20	706	15.7	4.60	26	15.5	0.17
07:30	727	15.4	4.48	26	15.6	0.17
07:40	727	15.5	4.56	31	15.4	0.19
07:50	768	15.4	4.74	33	14.9	0.19
08:00	779	14.3	4.00	34	14.1	0.17
08:10	794	14.2	4.02	39	14.1	0.20
08:20	795	13.6	3.69	33	13.5	0.15
08:30	777	13.7	3.66	35	13.4	0.16
08:40	830	14.1	4.14	44	14.0	0.21
11:40	848	14.9	4.80	31	15.4	0.19
11:50	742	15.8	4.94	41	15.6	0.26
12:00	788	15.8	5.24	30	15.8	0.20
12:10	783	15.4	4.83	44	15.2	0.26
12:20	783	15.6	5.01	46	15.7	0.30
12:30	808	15.3	4.87	43	15.3	0.26

continued

10 Minute Averages Continued March 11, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
12:40	764	15.5	4.83	35	15.6	0.23
12:50	786	15.4	4.84	42	15.2	0.25
13:00	830	15.1	4.85	42	15.3	0.26
13:10	832	15.1	4.84	42	15.3	0.25
13:20	815	15.2	4.84	41	15.2	0.24
13:30	790	15.3	4.80	38	15.3	0.23
14:40	766	14.9	4.31	33	14.9	0.19
15:00	773	14.4	4.03	40	14.5	0.21
15:10	752	14.3	3.87	34	14.3	0.17
15:40	837	13.2	3.67	28	13.8	0.13
15:50	***	19.5	****	20	13.8	0.10
16:10	581	15.5	3.64	***	16.6	****
16:20	604	16.2	4.40	***	20.3	****
16:30	709	15.3	4.27	26	15.4	0.16
16:40	764	15.0	4.42	35	15.1	0.20
16:50	809	14.9	4.54	36	15.2	0.22
17:00	793	15.0	4.54	35	15.4	0.21
17:10	811	14.8	4.53	43	15.1	0.25
17:20	811	15.0	4.66	39	15.0	0.23
17:30	806	14.9	4.55	44	15.0	0.25
17:40	808	14.8	4.52	44	15.1	0.26
17:50	804	15.0	4.62	44	15.3	0.27
18:00	763	15.3	4.59	46	15.0	0.26
18:10	804	15.0	4.60	43	15.1	0.25
18:20	795	15.3	4.78	39	15.3	0.23
18:30	790	15.1	4.60	42	15.0	0.24
18:40	786	15.1	4.57	38	15.2	0.23
18:50	747	15.5	4.68	32	15.6	0.21
19:00	712	15.7	4.63	33	15.4	0.20
19:10	783	15.1	4.58	36	15.2	0.22
19:20	779	15.2	4.60	33	15.5	0.21
19:30	848	14.8	4.70	31	15.1	0.18
19:40	940	14.4	4.90	37	15.0	0.21
19:50	889	14.5	4.72	50	14.8	0.28
20:00	896	14.4	4.70	48	14.6	0.26
20:10	877	14.6	4.75	45	14.7	0.25
20:20	909	14.4	4.74	52	14.5	0.28
20:30	940	14.3	4.84	57	14.4	0.30
20:40	984	14.1	4.92	59	14.4	0.31
20:50	986	14.0	4.86	60	14.2	0.30
21:00	993	13.9	4.79	63	14.3	0.32
21:10	1011	13.8	4.81	74	13.8	0.35
21:20	1016	13.7	4.77	71	13.8	0.34
21:30	969	14.0	4.75	62	14.1	0.31
21:40	949	14.0	4.65	55	14.4	0.29
21:50	905	14.3	4.68	49	14.4	0.26
22:00	929	14.2	4.69	40	15.1	0.23
22:10	855	14.7	4.67	36	15.1	0.21
22:20	865	14.8	4.77	46	14.8	0.26
22:30	884	14.7	4.81	37	15.5	0.23
22:40	763	15.6	4.85	34	15.6	0.22
22:50	753	15.6	4.85	30	15.5	0.19
23:00	706	15.8	4.72	28	15.8	0.19

10 Minute Averages
March 12, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	707	15.6	4.52	33	15.6	0.21
00:10	695	16.0	4.85	27	16.1	0.19
00:20	702	16.0	4.85	34	16.2	0.24
00:30	724	15.7	4.75	30	15.7	0.20
00:40	696	15.9	4.77	27	15.9	0.18
00:50	715	15.8	4.75	29	15.9	0.20
01:00	717	15.8	4.75	37	15.4	0.23
01:10	773	15.3	4.66	39	15.3	0.23
01:20	752	15.5	4.72	32	15.5	0.20
01:30	776	15.3	4.71	36	15.3	0.21
01:40	776	15.3	4.69	36	15.3	0.22
01:50	758	15.4	4.69	36	15.3	0.22
02:00	763	15.4	4.68	36	15.3	0.22
02:10	780	15.2	4.64	39	15.1	0.23
02:20	774	15.3	4.65	38	15.3	0.23
02:30	801	15.2	4.73	39	15.2	0.23
02:40	812	15.2	4.87	41	15.1	0.24
02:50	809	15.2	4.79	33	15.6	0.21
03:00	762	15.4	4.71	44	15.7	0.28
03:10	778	15.3	4.71	37	15.3	0.23
03:20	782	15.3	4.75	36	15.4	0.22
03:30	809	15.2	4.79	42	15.4	0.26
03:40	809	15.3	4.88	40	15.2	0.24
03:50	817	15.1	4.77	44	15.3	0.27
04:00	788	15.3	4.76	38	15.3	0.23
04:10	777	15.2	4.65	38	15.3	0.23
04:20	796	15.2	4.74	38	15.2	0.23
04:30	773	15.3	4.65	37	15.3	0.22
04:40	773	15.3	4.66	34	15.4	0.21
04:50	780	15.2	4.60	38	15.0	0.22
05:00	799	15.1	4.70	36	15.3	0.22
05:10	752	15.4	4.60	37	15.1	0.22
05:20	801	14.8	4.47	40	14.9	0.23
05:30	774	15.0	4.42	41	14.8	0.23
05:40	764	14.9	4.30	35	14.8	0.19
05:50	772	14.7	4.24	29	14.8	0.16
06:00	782	14.7	4.31	28	15.3	0.17
06:10	753	14.9	4.29	32	14.9	0.18
06:20	734	14.8	4.11	36	14.6	0.19
06:30	745	14.7	4.05	36	14.6	0.20
06:40	751	14.7	4.12	35	14.8	0.19
06:50	717	14.9	4.08	34	14.9	0.20
07:00	697	15.1	4.06	28	15.1	0.17
07:10	676	15.1	3.96	29	14.9	0.17
07:20	679	15.0	3.93	28	14.9	0.16
07:30	655	15.2	3.87	22	15.2	0.13
07:40	705	14.9	4.01	29	14.9	0.16
07:50	670	15.0	3.89	25	15.1	0.15
08:00	672	15.0	3.89	30	14.9	0.17
08:10	732	14.4	3.83	35	14.7	0.19
08:20	743	14.5	3.97	16	14.6	0.08
09:10	884	14.0	4.36	58	14.2	0.29
09:20	877	14.0	4.31	58	14.0	0.29
09:30	849	14.0	4.18	56	14.2	0.28
09:40	826	14.1	4.11	55	14.1	0.28
09:50	880	13.7	4.16	64	13.9	0.31
10:00	839	13.9	4.06	63	14.0	0.31
10:10	859	13.8	4.13	70	13.8	0.33
10:20	837	14.1	4.15	68	14.1	0.34

continued

10 Minute Averages Continued March 12, 1981

Start of 10 Minute Period	Scrubber Inlet			Scrubber Outlet		
	SO2 ppm	O2 %	E #/mmBtu	SO2 ppm	O2 %	E #/mmBtu
10:30	877	13.9	4.23	76	13.8	0.36
10:40	875	13.9	4.25	61	14.2	0.31
10:50	843	14.1	4.18	59	14.2	0.30
11:00	814	14.4	4.22	25	14.7	0.14
11:20	809	14.4	4.23	49	14.5	0.26
11:30	773	14.7	4.21	41	14.7	0.23
11:40	773	14.7	4.24	40	14.9	0.23
11:50	721	15.0	4.16	42	14.7	0.23
12:00	806	14.4	4.22	45	14.6	0.24
12:10	804	14.3	4.15	45	14.6	0.24
12:20	825	14.4	4.30	43	14.9	0.24
12:30	700	15.3	4.21	37	15.2	0.22
12:40	685	15.5	4.28	38	15.2	0.23
12:50	700	15.4	4.30	36	15.3	0.22
13:00	699	15.2	4.13	26	15.1	0.15
13:20	693	15.0	4.01	34	15.2	0.20
13:30	694	15.2	4.10	32	15.1	0.19
13:40	724	15.0	4.13	42	14.8	0.23
13:50	747	14.9	4.22	38	14.7	0.21
14:00	791	14.5	4.22	24	20.4	1.66
16:00	755	14.8	4.20	10	14.5	0.05
17:50	657	15.3	3.98	23	15.4	0.14
18:00	662	15.4	4.08	24	15.5	0.15
18:10	662	15.4	4.08	26	15.3	0.16
18:20	651	15.5	4.09	26	15.4	0.16
18:30	651	15.5	4.09	23	15.4	0.14
18:40	581	15.6	3.72	23	15.5	0.14
18:50	697	16.8	5.77	16	16.6	0.13
19:00	717	15.7	4.68	26	15.7	0.17
19:10	752	15.5	4.73	30	15.4	0.19
19:20	732	15.5	4.60	33	15.5	0.21
19:30	707	15.6	4.52	31	15.7	0.20
19:40	727	15.7	4.74	27	15.6	0.17
19:50	747	15.7	4.88	31	15.5	0.20
20:00	753	15.6	4.82	33	15.5	0.21
20:10	763	15.5	4.79	30	15.4	0.19
20:20	702	15.4	4.33	30	15.3	0.18
20:30	727	15.8	4.84	26	15.7	0.17
20:40	808	15.7	5.27	23	15.5	0.14
20:50	833	15.5	5.23	39	14.9	0.22
21:00	818	14.8	4.55	41	14.9	0.23
21:10	808	15.1	4.73	41	15.0	0.24
21:20	768	15.2	4.57	34	15.2	0.20
21:30	843	15.3	5.11	35	15.3	0.21
21:40	853	14.9	4.82	43	14.8	0.24
21:50	853	14.8	4.75	43	14.8	0.24
22:00	818	14.8	4.55	42	14.9	0.24
22:10	848	15.0	4.88	42	14.9	0.24
22:30	818	14.8	4.55	46	14.9	0.26
22:40	813	14.9	4.60	39	15.1	0.23
22:50	768	15.1	4.49	40	15.2	0.24
23:00	773	15.3	4.68	39	15.2	0.23
23:10	793	15.5	4.98	42	15.4	0.26
23:20	808	15.3	4.89	47	15.1	0.27

10 Minute Averages
March 14, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
03:00	838	14.5	4.44	59	14.5	0.31
03:10	789	15.0	4.54	57	15.0	0.33
03:20	807	15.1	4.72	58	15.1	0.34
03:30	794	14.6	4.27	58	14.6	0.31
03:40	789	14.8	4.39	61	14.7	0.33
03:50	803	15.0	4.62	53	15.0	0.30
04:00	799	15.0	4.59	56	14.9	0.32
04:10	759	15.2	4.52	54	15.1	0.32
04:20	789	15.2	4.70	61	15.1	0.36
04:30	799	15.4	4.93	56	15.5	0.35
04:40	803	15.2	4.78	57	15.4	0.35
04:50	808	15.4	4.98	57	15.4	0.35
05:00	785	15.6	5.02	56	15.5	0.35
05:10	799	15.9	5.39	55	15.7	0.36
05:20	638	15.8	5.57	54	15.9	0.37
05:30	823	16.1	5.82	54	16.0	0.37
05:40	838	16.0	5.80	53	15.9	0.36
05:50	843	16.1	5.96	50	16.1	0.35
06:00	799	16.2	5.77	58	16.2	0.42
06:10	818	16.2	5.90	58	16.3	0.43
06:20	813	16.4	6.13	53	16.3	0.39
06:30	818	16.2	5.90	51	16.1	0.36
06:40	829	16.1	5.86	50	16.1	0.35
06:50	789	16.1	5.58	57	16.0	0.39
07:00	803	16.1	5.67	55	16.3	0.41
07:10	818	16.5	6.31	53	16.5	0.41
07:20	823	16.2	5.94	55	16.3	0.41
07:30	833	16.5	6.42	60	16.4	0.45
07:40	789	16.4	5.95	59	16.3	0.44
07:50	838	16.4	6.32	59	16.3	0.44
08:00	838	16.4	6.32	58	16.4	0.44
08:10	818	16.5	6.31	56	16.4	0.42
08:20	818	15.9	5.55	60	15.6	0.38
08:30	769	15.5	4.83	65	15.4	0.40
08:40	803	15.4	4.95	58	15.3	0.35
08:50	794	15.3	4.81	60	15.4	0.37
11:20	842	15.5	5.29	77	15.5	0.48
11:30	792	15.5	4.98	78	15.5	0.49
11:40	833	15.4	5.14	89	15.4	0.55
11:50	863	15.4	5.32	89	15.4	0.55
12:00	851	15.6	5.39	87	15.6	0.55
12:10	842	15.6	5.34	88	15.6	0.55
12:20	854	15.6	5.46	94	15.6	0.60
12:30	858	15.6	5.49	93	15.6	0.60
12:40	880	15.6	5.63	85	15.6	0.55
12:50	771	15.6	4.93	75	15.6	0.48
13:00	799	16.1	5.65	73	16.1	0.51
13:10	811	16.1	5.73	81	16.1	0.57
13:20	837	16.1	5.92	78	16.1	0.55
13:30	700	16.1	4.95	57	16.1	0.40
13:40	720	16.4	5.43	60	16.4	0.45
13:50	762	16.4	5.74	60	16.4	0.45
14:00	757	16.2	5.46	65	16.2	0.47
14:10	795	16.2	5.73	62	16.2	0.45
14:20	695	16.6	5.49	51	16.6	0.40
14:30	688	16.6	5.42	47	16.6	0.37
14:40	670	16.5	5.17	48	16.5	0.37
14:50	709	16.5	5.47	35	16.5	0.27
15:40	697	17.3	6.57	45	17.3	0.43

continued

10 Minute Averages Continued March 14, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	O2 %	E #/mmBtu	Scrubber Outlet SO2 ppm	O2 %	E #/mmBtu
15:50	724	17.3	6.82	48	17.3	0.45
16:00	747	17.6	7.68	51	17.6	0.53
16:10	742	17.6	7.63	55	17.6	0.56
16:20	756	17.4	7.33	58	17.4	0.56
16:30	777	17.4	7.53	64	17.4	0.62
16:40	737	17.6	7.58	59	17.6	0.61
16:50	748	17.6	7.69	60	17.6	0.62
17:00	699	17.8	7.64	57	17.8	0.63
17:10	704	17.8	7.70	51	17.8	0.56
17:20	707	17.8	7.73	51	17.8	0.55
17:30	690	17.8	7.55	52	17.8	0.57
17:40	657	17.8	7.19	47	17.8	0.51
17:50	726	17.8	7.84	50	17.8	0.55
18:00	689	17.9	7.79	45	17.9	0.51
18:10	700	17.9	7.91	49	17.9	0.55
18:20	708	17.9	8.00	46	17.9	0.53
18:30	689	17.9	7.79	43	17.9	0.49
18:40	688	17.8	7.53	43	17.8	0.47
18:50	729	17.8	7.98	47	17.8	0.51
19:00	709	17.7	7.51	44	17.7	0.47
19:10	721	17.7	7.64	52	17.7	0.55
19:20	726	17.7	7.70	48	17.7	0.51
19:30	731	17.7	7.74	49	17.7	0.52
19:40	707	17.8	7.74	48	17.8	0.52
19:50	714	17.8	7.81	49	17.8	0.54
20:00	726	17.7	7.70	44	17.7	0.46
20:10	692	17.7	7.34	40	17.7	0.42
20:20	717	17.8	7.85	44	17.8	0.48
20:30	721	17.8	7.89	46	17.8	0.50
20:40	696	17.9	7.87	42	17.9	0.47
20:50	688	17.9	7.78	45	17.9	0.51
21:00	751	17.7	7.96	47	17.7	0.50
21:10	727	17.7	7.70	47	17.7	0.50
21:20	737	17.8	8.06	47	17.8	0.51
21:30	716	17.8	7.83	45	17.8	0.49
21:40	755	17.6	7.76	50	17.6	0.52
21:50	772	17.6	7.94	50	17.6	0.52
22:00	753	17.6	7.74	53	17.6	0.55
22:10	769	17.6	7.90	56	17.6	0.58
22:20	749	17.7	7.94	47	17.7	0.49
22:30	739	17.7	7.83	47	17.7	0.50
22:40	781	17.7	8.28	52	17.7	0.55
22:50	738	17.7	7.82	48	17.7	0.51
23:00	724	17.8	7.93	45	17.8	0.49
23:10	894	17.8	9.78	41	17.8	0.45
23:20	695	17.9	7.86	44	17.9	0.50
23:30	719	17.9	8.13	43	17.9	0.49
23:40	757	18.0	8.85	42	18.0	0.50
23:50	694	18.0	8.12	40	18.0	0.47

10 Minute Averages
March 15, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:40	656	18.1	7.95	27	18.1	0.33
00:50	663	18.1	8.04	28	18.1	0.34
01:00	684	18.1	8.28	26	18.1	0.32
01:10	701	18.1	8.49	35	18.1	0.42
01:20	727	18.0	8.51	35	18.0	0.41
01:30	728	18.0	8.52	36	18.0	0.42
01:40	700	18.0	8.19	30	18.0	0.36
01:50	696	18.0	8.14	32	18.0	0.37
02:00	722	17.8	7.90	35	17.8	0.38
02:10	782	17.8	8.56	39	17.8	0.43
02:20	761	17.7	8.06	43	17.7	0.45
02:30	776	17.7	8.22	42	17.7	0.45
02:40	786	17.6	8.08	39	17.6	0.40
02:50	746	17.6	7.67	38	17.6	0.39
03:00	765	17.8	8.37	37	17.8	0.40
03:10	742	17.8	8.11	35	17.8	0.39
03:20	722	17.9	8.16	37	17.9	0.42
03:30	699	17.9	7.90	31	17.9	0.35
03:40	703	18.0	8.22	38	18.0	0.44
03:50	744	18.0	8.71	38	18.0	0.45
04:00	726	17.9	8.20	36	17.9	0.40
04:10	757	17.9	8.55	35	17.9	0.40
04:20	705	17.9	7.97	29	17.9	0.33
04:30	730	17.9	8.25	37	17.9	0.42
04:40	726	17.9	8.21	36	17.9	0.40
04:50	732	17.9	8.28	34	17.9	0.38
05:00	717	17.9	8.11	33	17.9	0.37
05:10	706	17.9	7.99	33	17.9	0.38
05:20	726	17.9	8.21	37	17.9	0.42
05:30	742	17.9	8.39	36	17.9	0.41
05:40	710	18.0	8.31	35	18.0	0.41
05:50	709	18.0	8.29	34	18.0	0.40
06:00	743	17.8	8.13	38	17.8	0.42
06:10	744	17.8	8.14	39	17.8	0.42
06:20	755	17.7	8.00	37	17.7	0.39
06:30	777	17.7	8.23	36	17.7	0.38
06:40	743	17.8	8.13	39	17.8	0.43
06:50	755	17.8	8.27	40	17.8	0.44
07:00	746	17.8	8.17	38	17.8	0.41
07:10	729	17.8	7.97	39	17.8	0.43
07:20	708	17.9	8.00	38	17.9	0.43
07:30	721	17.9	8.15	40	17.9	0.45
07:40	749	17.8	8.20	42	17.8	0.45
07:50	748	17.8	8.18	40	17.8	0.44
08:00	782	17.7	8.29	38	17.7	0.40
08:10	712	17.7	7.55	35	17.7	0.37
08:20	726	***	1.18	37	***	0.06
08:30	740	17.8	8.09	42	17.8	0.45
08:40	747	17.7	7.92	64	17.7	0.68
08:50	682	17.7	7.23	50	17.7	0.53
09:00	727	17.8	7.95	62	17.8	0.68
09:10	719	17.8	7.86	69	17.8	0.76
09:20	714	18.0	8.35	35	18.0	0.41
09:30	578	18.0	6.76	17	18.0	0.20
09:40	726	17.8	7.94	36	17.8	0.39
09:50	723	17.8	7.91	34	17.8	0.37
10:00	725	17.8	7.94	34	17.8	0.37
10:10	748	17.8	8.18	40	17.8	0.44
10:20	686	17.9	7.76	31	17.9	0.35

continued

10 Minute Averages Continued March 15, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
10:30	676	17.9	7.64	30	17.9	0.34
11:20	696	18.1	8.44	33	18.1	0.41
11:30	508	18.1	6.15	42	18.1	0.51
11:40	661	18.2	8.30	42	18.2	0.52
11:50	632	18.2	7.95	35	18.2	0.44
12:00	719	18.0	8.41	59	18.0	0.69
12:10	657	18.0	7.68	62	18.0	0.73
13:00	680	15.0	3.91	35	15.0	0.20
13:10	689	15.0	3.96	50	15.0	0.29
13:20	692	15.1	4.05	35	15.1	0.21
13:30	701	15.1	4.10	36	15.1	0.21
13:40	718	15.0	4.13	44	15.0	0.26
13:50	769	15.0	4.42	78	15.0	0.45
14:00	780	14.8	4.34	83	14.8	0.46
14:10	735	14.8	4.09	79	14.8	0.44
14:20	721	15.3	4.36	76	15.3	0.46
14:30	444	15.3	2.69	47	15.3	0.29
14:40	708	15.1	4.14	79	15.1	0.46
14:50	688	15.1	4.02	78	15.1	0.45
15:00	657	15.2	3.91	74	15.2	0.44
15:10	663	15.2	3.95	70	15.2	0.42
15:20	659	15.3	3.99	66	15.3	0.40
15:30	653	15.3	3.96	63	15.3	0.38
15:40	666	15.5	4.18	67	15.5	0.42
15:50	532	15.5	3.34	44	15.5	0.28
16:00	590	15.8	3.92	54	15.8	0.36
16:10	596	15.8	3.96	31	15.8	0.21
16:20	635	15.6	4.07	29	15.6	0.18
16:30	581	15.6	3.72	27	15.6	0.18
16:40	621	15.3	3.76	29	15.3	0.18
16:50	631	15.3	3.82	32	15.3	0.20
17:00	606	15.7	3.95	35	15.7	0.23
17:10	648	15.7	4.22	33	15.7	0.22
17:20	623	15.5	3.91	32	15.5	0.20
17:30	619	15.5	3.89	32	15.5	0.20
17:40	628	15.5	3.95	33	15.5	0.21
17:50	623	15.5	3.91	29	15.5	0.18
18:00	611	15.6	3.91	30	15.6	0.19
18:10	611	15.6	3.91	26	15.6	0.17
18:20	598	15.7	3.90	24	15.7	0.16
18:30	615	15.7	4.01	27	15.7	0.18
18:40	600	15.6	3.84	29	15.6	0.18
18:50	594	15.6	3.80	27	15.6	0.18
19:00	624	15.5	3.92	27	15.5	0.17
19:10	621	15.5	3.90	27	15.5	0.17
19:20	691	14.8	3.84	33	14.8	0.19
19:30	734	14.8	4.08	38	14.8	0.21
19:40	730	14.6	3.93	41	14.6	0.22
19:50	735	14.6	3.96	41	14.6	0.22
20:00	730	14.7	3.99	40	14.7	0.22
20:10	727	14.7	3.98	44	14.7	0.24
20:20	773	14.5	4.09	45	14.5	0.24
20:30	759	14.5	4.02	44	14.5	0.23
20:40	770	14.7	4.21	50	14.7	0.28
20:50	719	14.7	3.94	36	14.7	0.20
21:00	684	15.0	3.93	38	15.0	0.22
21:10	711	15.0	4.09	38	15.0	0.22
21:20	688	15.3	4.16	41	15.3	0.25
21:30	604	15.3	3.66	29	15.3	0.17
21:40	580	15.9	3.93	25	15.9	0.17
21:50	593	15.9	4.02	27	15.9	0.18
22:00	587	15.8	3.90	26	15.8	0.17

continued

10 Minute Averages Continued March 15, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
22:10	611	15.8	4.06	27	15.8	0.18
22:20	566	16.1	4.00	24	16.1	0.17
22:30	563	16.1	3.98	24	16.1	0.17
22:40	560	16.4	4.22	23	16.4	0.17
22:50	526	16.4	3.96	19	16.4	0.14
23:00	501	16.5	3.86	18	16.5	0.14
23:10	561	16.5	4.33	23	16.5	0.17
23:20	572	16.3	4.22	24	16.3	0.17
23:30	529	16.3	3.90	21	16.3	0.15
23:40	521	16.6	4.11	17	16.6	0.13
23:50	623	16.6	4.91	29	16.6	0.23

10 Minute Averages
March 16, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	651	15.5	4.09	41	15.5	0.26
00:10	623	15.5	3.92	39	15.5	0.25
00:20	620	15.6	3.97	41	15.6	0.26
00:30	642	15.6	4.11	41	15.6	0.26
00:40	616	15.7	4.02	41	15.7	0.27
00:50	612	15.7	3.99	38	15.7	0.25
01:00	587	15.9	3.98	39	15.9	0.26
01:10	603	15.9	4.09	37	15.9	0.25
01:20	600	15.8	3.99	39	15.8	0.26
01:30	620	15.8	4.12	42	15.8	0.28
01:40	623	15.3	3.77	43	15.3	0.26
01:50	679	15.3	4.11	46	15.3	0.28
02:00	691	14.7	3.78	49	14.7	0.27
02:10	752	14.7	4.11	52	14.7	0.29
02:20	775	14.4	4.04	54	14.4	0.28
02:30	749	14.4	3.91	54	14.4	0.28
02:40	776	14.2	3.83	60	14.2	0.31
02:50	788	14.2	3.89	57	14.2	0.29
03:00	751	14.7	4.11	53	14.7	0.29
03:10	692	14.7	3.79	49	14.7	0.27
03:20	665	14.9	3.76	47	14.9	0.27
03:30	711	14.9	4.02	49	14.9	0.28
03:40	732	14.8	4.07	50	14.8	0.28
03:50	694	14.8	3.86	52	14.8	0.29
04:00	681	14.9	3.85	51	14.9	0.29
04:10	688	14.9	3.89	52	14.9	0.29
04:20	693	14.9	3.92	50	14.9	0.28
04:30	662	14.9	3.74	47	14.9	0.26
04:40	651	15.1	3.81	47	15.1	0.28
04:50	632	15.1	3.70	46	15.1	0.27
05:00	641	15.4	3.95	43	15.4	0.27
05:10	628	15.4	3.88	45	15.4	0.27
05:20	643	15.4	3.96	49	15.4	0.30
05:30	664	15.4	4.09	50	15.4	0.31
05:40	644	15.2	3.83	48	15.2	0.28
05:50	663	15.2	3.95	52	15.2	0.31
06:00	633	15.5	3.98	57	15.5	0.36
06:10	630	15.5	3.96	47	15.5	0.29
06:20	639	15.5	4.02	48	15.5	0.30
06:30	628	15.5	3.94	49	15.5	0.31
06:40	650	15.4	4.01	60	15.4	0.37
06:50	648	15.4	4.00	73	15.4	0.45
07:00	670	15.1	3.92	75	15.1	0.44
07:10	717	15.1	4.19	84	15.1	0.49
07:20	731	14.8	4.06	85	14.8	0.48
07:30	697	14.8	3.87	90	14.8	0.50
07:40	682	15.2	4.06	87	15.2	0.52
07:50	670	15.2	3.99	86	15.2	0.51
08:00	728	14.9	4.12	91	14.9	0.51
08:10	711	14.9	4.02	80	14.9	0.45
08:20	724	14.8	4.02	86	14.8	0.48
08:30	745	14.8	4.14	94	14.8	0.52
08:40	797	14.3	4.10	107	14.3	0.55
08:50	826	14.3	4.24	106	14.3	0.54
09:00	831	14.4	4.34	87	14.4	0.45
09:10	801	14.4	4.18	63	14.4	0.33
09:20	811	14.4	4.23	59	14.4	0.31
09:30	796	14.4	4.16	38	14.4	0.20
09:40	816	14.3	4.19	27	14.3	0.14

continued

10 Minute Averages Continued March 16, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
09:50	824	14.3	4.24	29	14.3	0.15
10:00	746	14.9	4.22	27	14.9	0.15
10:10	725	14.9	4.10	26	14.9	0.15
10:20	775	14.7	4.24	32	14.7	0.18
10:30	778	14.7	4.25	35	14.7	0.19
10:40	810	14.6	4.33	45	14.6	0.24
11:40	1000	13.9	4.85	109	13.9	0.53
11:50	937	13.9	4.54	104	13.9	0.50
12:00	945	13.8	4.51	111	13.8	0.53
12:10	1019	13.8	4.87	119	13.8	0.57
12:20	1023	13.8	4.89	129	13.8	0.62
12:30	1108	13.8	5.29	126	13.8	0.60
12:40	659	15.8	4.39	61	15.8	0.40
12:50	700	15.8	4.65	69	15.8	0.46
13:00	693	15.4	4.27	66	15.4	0.41
13:10	752	15.4	4.64	66	15.4	0.41
13:20	1099	12.3	4.33	107	12.3	0.42
13:30	1116	12.3	4.40	97	12.3	0.38
13:40	1179	11.9	4.44	128	11.9	0.48
13:50	1176	11.9	4.43	120	11.9	0.45
14:00	811	14.5	4.30	97	14.5	0.51
14:10	764	14.2	3.87	93	14.2	0.47
14:20	1082	14.2	5.48	126	14.2	0.64
14:30	464	14.7	2.54	61	14.7	0.33
14:40	1014	14.7	5.55	93	14.7	0.51
14:50	1012	13.3	4.52	93	13.3	0.41
15:00	1144	12.8	4.79	130	12.8	0.55
15:10	1196	25.9	****	139	25.9	****
15:20	1017	13.1	4.42	84	13.1	0.36
15:30	1050	13.1	4.56	149	13.1	0.65
15:40	1206	12.6	4.93	134	12.6	0.55
15:50	1036	12.6	4.23	82	12.6	0.34
16:00	1017	13.4	4.60	95	13.4	0.43
16:10	1069	13.4	4.83	99	13.4	0.45
16:20	1128	12.9	4.78	110	12.9	0.46
16:30	1103	12.9	4.68	99	12.9	0.42
16:40	1032	13.0	4.43	88	13.0	0.38
16:50	1142	13.0	4.91	118	13.0	0.51
17:00	1141	12.8	4.78	117	12.8	0.49
17:10	1109	12.8	4.64	95	12.8	0.40
17:20	1095	12.8	4.58	99	12.8	0.42
17:30	1118	12.8	4.68	120	12.8	0.50
17:40	1188	12.5	4.80	140	12.5	0.57
17:50	1140	12.5	4.60	123	12.5	0.50
18:00	1085	13.4	4.91	114	13.4	0.51
18:10	1014	13.4	4.58	113	13.4	0.51
18:20	986	13.9	4.78	117	13.9	0.57
18:30	1008	13.9	4.88	113	13.9	0.55
18:40	995	14.2	5.04	111	14.2	0.56
18:50	939	14.2	4.76	107	14.2	0.54
19:00	951	14.5	5.04	105	14.5	0.56
19:10	931	14.5	4.93	130	14.5	0.69
19:20	1007	14.1	5.02	145	14.1	0.72
19:30	955	14.1	4.76	140	14.1	0.70
19:40	971	14.4	5.07	137	14.4	0.71
19:50	913	14.4	4.76	132	14.4	0.69
20:00	914	14.3	4.70	131	14.3	0.67
20:10	1010	14.3	5.19	147	14.3	0.76
20:20	1062	13.3	4.74	197	13.3	0.88
20:30	1113	13.3	4.97	215	13.3	0.96
20:40	1051	13.4	4.75	202	13.4	0.91
20:50	1098	13.4	4.96	233	13.4	1.05

continued

10 Minute Averages Continued March 16, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
21:00	1147	13.4	5.18	205	13.4	0.92
21:10	1025	13.4	4.63	166	13.4	0.75
21:20	1039	13.8	4.96	163	13.8	0.78
21:30	1024	13.8	4.89	163	13.8	0.78
21:40	1055	13.7	4.97	183	13.7	0.86
21:50	1010	13.7	4.76	183	13.7	0.86
22:00	998	14.0	4.91	173	14.0	0.85
22:10	1019	14.0	5.01	178	14.0	0.88
22:20	1002	14.2	5.07	175	14.2	0.89
22:30	945	14.2	4.78	165	14.2	0.83
22:40	967	14.1	4.82	192	14.1	0.96
22:50	1021	14.1	5.09	190	14.1	0.95
23:00	1048	14.1	5.23	179	14.1	0.89
23:10	985	14.1	4.91	172	14.1	0.86
23:20	1077	13.7	5.07	192	13.7	0.91
23:30	998	13.7	4.70	185	13.7	0.87
23:40	1050	13.6	4.88	194	13.6	0.90
23:50	1105	13.6	5.13	218	13.6	1.01

10 Minute Averages
March 17, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	1054	12.7	4.38	167	13.0	0.72
00:10	1054	12.8	4.40	159	13.3	0.71
00:20	1064	12.7	4.39	156	13.3	0.69
00:30	1032	12.9	4.37	155	13.9	0.75
00:40	1019	12.9	4.33	137	13.7	0.65
00:50	1056	12.7	4.34	150	13.4	0.67
01:00	1067	12.6	4.38	141	13.3	0.63
01:10	1097	12.4	4.39	161	13.1	0.70
01:20	1087	12.4	4.35	170	13.0	0.73
01:30	1074	12.6	4.38	170	13.1	0.74
01:40	1050	12.7	4.37	158	13.1	0.69
01:50	1050	12.7	4.36	158	13.2	0.69
02:00	1055	12.7	4.35	136	13.4	0.62
02:10	1015	13.0	4.38	159	13.7	0.75
02:20	1000	13.1	4.33	164	13.8	0.78
02:30	989	13.2	4.36	146	13.8	0.70
02:40	991	13.2	4.38	133	13.7	0.63
02:50	946	13.5	4.32	118	14.2	0.59
03:00	947	13.5	4.33	130	13.9	0.63
03:10	982	13.2	4.35	118	14.1	0.59
03:20	970	13.2	4.29	141	13.7	0.66
03:30	1001	13.0	4.30	147	13.6	0.68
03:40	992	13.0	4.24	155	13.5	0.71
03:50	996	13.2	4.36	148	13.7	0.70
04:00	945	13.6	4.39	142	14.0	0.70
04:10	969	13.3	4.35	144	14.3	0.74
04:20	975	13.3	4.33	149	14.2	0.75
04:30	948	13.5	4.36	131	14.0	0.64
04:40	944	13.4	4.28	143	13.8	0.68
04:50	943	13.3	4.21	134	13.9	0.65
05:00	945	13.4	4.27	138	13.8	0.66
05:10	955	13.2	4.23	132	13.9	0.64
05:20	899	13.7	4.26	134	14.0	0.66
05:30	962	13.2	4.23	132	13.8	0.62
05:40	948	13.2	4.19	134	13.9	0.65
05:50	906	13.6	4.21	135	13.9	0.65
06:00	936	13.3	4.17	158	14.2	0.80
06:10	958	13.2	4.23	159	13.9	0.77
06:20	907	13.5	4.17	161	14.1	0.80
06:30	883	13.7	4.15	121	14.2	0.61
06:40	867	13.7	4.10	110	14.5	0.59
06:50	932	13.3	4.17	152	13.5	0.70
07:00	963	12.9	4.07	149	13.3	0.67
07:10	984	12.8	4.12	167	13.2	0.73
07:20	998	12.4	3.98	181	12.9	0.76
07:30	1049	12.0	4.01	202	12.5	0.82
07:40	1072	11.7	3.96	220	12.7	0.91
07:50	1023	12.0	3.90	203	12.5	0.82
08:00	1050	11.8	3.89	200	12.4	0.80
08:10	1068	11.7	3.92	169	12.2	0.66
08:20	1017	11.8	3.79	138	12.3	0.55
08:30	998	11.9	3.76	155	12.0	0.59
08:40	993	11.9	3.76	153	12.3	0.60
08:50	1006	11.9	3.79	158	12.4	0.63
09:00	964	12.3	3.80	141	12.7	0.58
09:10	971	12.3	3.85	163	13.1	0.71
09:20	915	12.8	3.81	147	13.5	0.67
09:30	876	13.1	3.83	129	13.5	0.59
09:40	879	13.0	3.76	140	13.4	0.64

continued

10 Minute Averages Continued March 17, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
09:50	889	13.1	3.88	147	13.4	0.66
10:10	909	13.2	4.00	130	13.9	0.63
10:20	943	12.9	3.99	143	13.6	0.67
10:30	913	13.1	3.97	133	13.5	0.61
10:40	954	12.8	4.01	147	13.4	0.67
15:10	954	10.7	3.18	145	11.5	0.52
15:20	985	11.1	3.40	155	11.8	0.58
15:30	955	11.5	3.45	166	11.7	0.61
15:40	995	11.4	3.54	169	11.8	0.63
15:50	987	11.3	3.49	170	11.2	0.59
16:00	1003	11.3	3.55	158	12.0	0.60
16:10	964	11.6	3.53	151	12.0	0.58
16:20	976	11.7	3.59	154	12.0	0.59
16:30	949	11.8	3.53	151	11.9	0.57
16:40	997	11.6	3.62	149	12.2	0.58
16:50	959	11.7	3.55	140	12.5	0.56
17:00	949	11.4	3.38	141	12.3	0.56
17:10	919	12.0	3.49	120	12.5	0.48
17:20	929	12.0	3.55	116	12.6	0.47
17:30	879	12.4	3.50	107	12.8	0.45
17:40	905	12.2	3.54	122	12.5	0.49
17:50	917	12.1	3.51	134	12.4	0.53
18:00	872	12.3	3.46	102	12.7	0.42
18:10	878	12.3	3.47	105	12.8	0.44
18:20	870	12.4	3.48	97	13.0	0.42
18:30	871	12.4	3.49	86	13.1	0.37
18:40	836	12.6	3.41	94	13.0	0.40
18:50	822	12.7	3.39	102	12.9	0.43
19:00	809	12.8	3.38	105	13.0	0.45
19:10	836	12.6	3.43	108	12.9	0.46
19:20	833	12.7	3.44	109	13.0	0.47
19:30	796	13.0	3.40	88	13.2	0.39
19:40	863	12.4	3.46	114	12.6	0.47
19:50	867	12.4	3.44	129	12.6	0.52
20:00	922	12.1	3.55	96	12.9	0.41
20:10	849	12.6	3.46	131	12.7	0.54
20:20	841	12.7	3.46	131	12.7	0.54
20:30	915	12.1	3.54	137	12.5	0.55
20:40	906	12.1	3.49	136	12.5	0.55
20:50	886	12.2	3.47	106	12.9	0.45
21:00	831	12.6	3.39	108	12.9	0.46
21:10	804	12.8	3.38	96	13.0	0.41
21:20	892	12.3	3.52	92	12.9	0.39
21:30	906	12.2	3.52	94	12.6	0.38
21:40	898	12.2	3.51	104	12.8	0.43
21:50	886	12.2	3.47	94	12.8	0.39
22:00	875	12.4	3.48	117	12.5	0.48
22:10	875	12.4	3.49	121	12.7	0.50
22:20	868	12.5	3.49	114	12.9	0.48
22:30	827	12.7	3.42	102	12.9	0.43
22:40	858	12.5	3.47	112	12.8	0.47
22:50	857	12.5	3.44	120	12.7	0.49
23:00	851	12.5	3.44	110	12.9	0.47
23:10	846	12.6	3.46	94	13.1	0.41
23:20	832	12.6	3.40	81	13.0	0.35
23:30	760	13.1	3.31	89	13.5	0.41
23:40	731	13.3	3.28	84	13.6	0.30
23:50	716	13.4	3.24	67	13.5	0.30

10 Minute Averages
March 18, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	686	13.8	3.28	45	14.2	0.23
00:10	756	13.3	3.37	93	13.1	0.40
00:20	824	12.7	3.42	95	12.9	0.41
00:30	779	13.1	3.37	92	13.2	0.41
00:40	813	13.0	3.47	98	13.3	0.43
00:50	790	13.0	3.41	87	13.4	0.39
01:00	862	12.6	3.53	95	13.3	0.42
01:10	783	13.1	3.40	88	13.5	0.40
01:20	839	12.8	3.50	97	13.3	0.43
01:30	673	14.0	3.29	55	13.9	0.27
01:40	891	12.3	3.53	124	12.7	0.51
01:50	867	12.4	3.44	129	12.6	0.53
02:00	879	12.3	3.45	114	12.9	0.49
02:10	808	12.7	3.36	132	12.4	0.53
02:20	880	12.2	3.44	117	12.6	0.48
02:30	847	12.4	3.37	111	12.7	0.46
02:40	844	12.4	3.36	101	12.6	0.41
02:50	867	12.9	3.66	89	12.6	0.37
03:00	845	12.1	3.26	148	12.6	0.61
03:10	884	12.0	3.35	113	12.9	0.48
03:20	843	12.3	3.32	106	12.6	0.43
03:30	830	12.4	3.32	107	12.7	0.44
03:40	874	11.8	3.24	128	12.4	0.51
03:50	876	12.8	3.68	122	12.4	0.49
04:00	897	11.9	3.38	135	12.2	0.53
04:10	901	11.5	3.26	130	12.3	0.51
04:20	880	12.0	3.34	138	12.8	0.58
04:30	912	11.6	3.33	130	12.4	0.52
04:40	906	11.8	3.38	159	13.0	0.69
04:50	966	11.7	3.55	166	11.6	0.61
05:00	984	11.6	3.60	188	11.9	0.70
05:10	919	11.9	3.46	166	12.2	0.65
05:20	938	12.0	3.56	159	12.3	0.63
05:30	935	12.0	3.55	178	14.8	0.99
05:40	962	11.7	3.56	164	12.9	0.69
05:50	883	12.5	3.58	110	13.3	0.49
06:00	838	12.8	3.53	158	13.2	0.70
06:10	897	12.4	3.60	133	12.9	0.56
06:20	989	12.0	3.76	213	12.6	0.87
06:30	1003	12.6	4.11	200	12.1	0.77
06:40	1029	11.7	3.78	222	11.8	0.83
06:50	939	12.2	3.66	176	12.6	0.72
07:00	948	12.2	3.68	201	12.3	0.79
07:10	928	12.5	3.77	142	12.9	0.60
07:20	921	12.6	3.74	131	13.1	0.57
07:30	927	12.6	3.78	159	13.0	0.68
07:40	897	12.7	3.72	159	12.9	0.68
07:50	940	12.5	3.81	187	12.8	0.78
08:00	946	12.4	3.79	190	12.7	0.79
08:10	963	12.4	3.83	191	12.9	0.82
08:20	914	12.7	3.79	182	13.1	0.79
08:30	908	12.8	3.81	172	13.0	0.74
08:40	918	12.7	3.81	172	12.9	0.73
08:50	967	12.4	3.86	168	12.8	0.71
09:00	943	12.6	3.83	197	13.3	0.88
09:10	903	12.9	3.82	193	13.4	0.87
09:20	904	12.8	3.81	157	13.2	0.69
09:30	851	13.2	3.75	150	13.5	0.69
09:40	952	12.5	3.85	188	12.7	0.78

continued

10 Minute Averages Continued March 18, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
09:50	970	14.1	4.85	194	14.7	1.05
10:00	999	14.1	4.95	191	14.6	1.02
10:10	960	14.3	4.93	186	14.8	1.03
10:20	946	14.4	4.95	172	14.9	0.98
10:30	946	14.5	5.05	168	14.7	0.92
10:40	958	14.3	4.92	174	15.0	1.00
11:10	993	14.1	4.92	72	18.8	1.15
11:20	1000	14.2	5.07	211	14.7	1.14
11:30	1016	13.8	4.84	209	14.3	1.07
11:40	954	14.3	4.87	183	14.8	1.02
11:50	923	14.4	4.84	201	14.5	1.07
12:00	967	14.1	4.84	190	14.4	0.99
12:10	964	14.1	4.79	193	14.5	1.02
12:20	1012	13.8	4.84	213	14.2	1.08
12:30	988	13.9	4.79	203	14.4	1.07
12:40	926	14.4	4.80	180	14.7	0.99
12:50	935	14.4	4.86	185	14.6	1.00
13:30	847	14.0	4.15	266	14.9	1.51
13:40	794	14.7	4.34	270	15.2	1.59
16:30	932	15.0	5.38	91	21.5	****
16:40	866	15.7	5.64	93	21.6	****
16:50	925	15.3	5.55	113	15.0	0.65
17:00	901	15.2	5.37	107	15.4	0.66
17:10	879	15.4	5.39	123	15.8	0.82
17:20	863	15.4	5.29	112	15.8	0.75
17:30	888	15.3	5.34	111	15.8	0.74
17:40	893	15.2	5.29	117	15.7	0.76
17:50	906	15.1	5.31	96	15.4	0.59
18:00	931	14.9	5.29	113	15.2	0.67
18:10	1049	14.0	5.15	166	14.8	0.93
18:20	986	14.4	5.14	144	14.7	0.78
18:30	1003	14.1	5.04	169	14.8	0.95
18:40	1003	14.2	5.07	169	14.6	0.91
18:50	972	14.5	5.12	148	15.1	0.86
19:00	966	14.6	5.21	133	14.8	0.75
19:10	984	14.4	5.13	125	15.0	0.71
19:20	955	14.6	5.16	127	15.1	0.74
19:30	943	14.8	5.20	134	14.8	0.74
19:40	962	14.6	5.16	138	14.9	0.78
19:50	947	14.7	5.15	134	15.3	0.81
20:00	962	14.6	5.16	137	15.2	0.82
20:10	926	14.8	5.11	131	15.3	0.79
20:20	927	14.8	5.12	110	15.2	0.65
20:30	952	14.6	5.11	120	14.9	0.68
20:40	969	14.5	5.16	131	14.9	0.74
20:50	950	14.6	5.11	124	14.8	0.69
21:00	916	14.7	5.04	119	15.0	0.68
21:10	947	14.5	5.04	156	15.2	0.93
21:20	930	14.7	5.06	145	15.3	0.87
21:30	942	14.5	5.00	138	15.3	0.83
21:40	968	14.5	5.14	132	14.9	0.75
21:50	979	14.4	5.07	138	14.7	0.75
22:00	947	14.7	5.16	139	15.4	0.86
22:10	970	14.7	5.31	128	15.1	0.75
22:20	957	14.9	5.37	132	15.3	0.80
22:30	943	15.0	5.39	123	15.4	0.76
22:40	921	15.2	5.48	150	15.6	0.96
22:50	968	14.8	5.41	145	15.6	0.92
23:00	953	15.0	5.47	146	15.6	0.93
23:10	959	14.8	5.37	156	15.6	0.99
23:20	941	15.1	5.51	131	15.5	0.82
23:30	932	15.2	5.55	129	15.6	0.82

continued

10 Minute Averages Continued March 18, 1981

Start of 10 Minute Period	Scrubber Inlet			Scrubber Outlet		
	SO2 ppm	O2 %	E #/mmBtu	SO2 ppm	O2 %	E #/mmBtu
23:40	924	15.3	5.57	155	15.8	1.03
23:50	941	15.2	5.64	125	15.7	0.82

10 Minute Averages
March 19, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	923	15.4	5.69	129	15.8	0.85
00:10	924	15.4	5.70	140	16.1	0.88
00:20	911	15.5	5.74	115	16.7	0.92
00:30	834	16.0	5.79	116	16.6	0.92
00:40	786	16.4	5.93	94	16.3	0.69
00:50	978	15.1	5.71	144	15.8	0.95
01:00	930	15.2	5.58	119	15.7	0.77
01:10	931	15.4	5.73	133	15.6	0.86
01:20	990	14.9	5.60	146	15.5	0.91
01:30	924	15.4	5.75	150	16.1	1.06
01:40	937	15.3	5.63	128	15.7	0.83
01:50	906	15.6	5.76	131	15.9	0.90
02:00	955	15.3	5.76	134	15.3	0.81
02:10	899	14.8	5.57	166	15.5	1.04
02:20	1030	14.5	5.49	160	14.9	0.90
02:30	1048	14.4	5.50	182	15.4	1.12
02:40	1035	14.6	5.56	171	14.9	0.97
02:50	1001	14.9	5.64	182	15.4	1.13
03:00	1049	14.4	5.48	165	14.7	0.90
03:10	961	15.0	5.52	154	15.7	1.01
03:20	986	14.9	5.53	152	15.7	1.00
04:30	972	14.7	5.34	167	15.2	1.00
04:40	957	14.8	5.36	154	15.1	0.90
04:50	933	14.9	5.31	154	15.6	0.99
05:00	956	14.8	5.34	142	15.7	0.92
05:10	894	15.2	5.31	137	16.0	0.96
05:20	865	15.4	5.31	114	16.5	0.87
05:30	845	15.6	5.37	120	16.2	0.87
05:40	868	15.4	5.32	109	15.6	0.70
05:50	853	15.5	5.40	129	15.9	0.88
06:00	1100	13.8	5.24	178	14.3	0.92
06:10	1009	14.2	5.12	222	14.4	1.15
06:20	1080	13.7	5.05	211	14.1	1.04
06:30	1114	13.4	5.02	237	14.2	1.19
06:40	1113	13.5	5.08	244	14.3	1.25
06:50	1137	13.2	5.02	250	14.2	1.27
07:00	1161	13.1	5.07	247	14.0	1.22
07:10	1156	13.0	4.98	253	13.9	1.22
07:20	1114	13.3	4.99	214	14.5	1.14
07:30	1123	13.3	5.04	242	14.3	1.24
07:40	1117	13.4	5.05	235	13.6	1.10
07:50	1127	13.3	5.02	213	14.1	1.06
08:00	1045	13.8	5.01	175	14.2	0.88
08:10	1056	13.8	5.01	193	14.4	1.01
08:20	1043	13.9	5.07	172	14.2	0.87
08:30	1091	13.5	5.01	202	14.3	1.04
08:40	1077	13.6	5.03	188	14.5	1.00
08:50	979	14.3	5.04	150	15.0	0.87
09:00	933	14.7	5.13	132	15.2	0.78
09:10	946	14.7	5.21	128	15.0	0.74
09:20	943	14.8	5.26	112	15.1	0.68
09:30	929	14.9	5.28	109	15.3	0.66
09:40	919	15.1	5.34	112	15.4	0.70
09:50	821	15.9	5.52	93	15.9	0.63
10:00	866	15.5	5.46	96	16.1	0.67
10:10	857	15.6	5.49	96	16.3	0.71
10:20	840	15.7	5.49	94	16.3	0.70
10:30	844	15.8	5.58	91	16.3	0.67
11:10	1025	14.2	5.20	142	14.5	0.75

continued

10 Minute Averages Continued March 19, 1981

Start of 10 Minute Period	Scrubber Inlet			Scrubber Outlet		
	SO2 ppm	O2 %	E #/mmBtu	SO2 ppm	O2 %	E #/mmBtu
11:20	1100	14.5	5.81	169	15.1	0.98
11:30	1059	14.8	5.92	165	15.4	1.03
11:40	1005	15.1	5.89	154	15.7	1.01
11:50	1043	14.9	5.94	154	15.7	1.00
12:00	1069	14.6	5.79	176	15.5	1.09
12:10	1042	14.9	5.89	158	15.6	1.00
12:20	972	14.5	5.17	153	15.0	0.88
12:30	960	14.6	5.15	148	15.0	0.85
12:40	937	14.8	5.21	147	15.1	0.86
12:50	972	14.6	5.20	228	13.9	1.10
13:30	860	14.4	4.49	117	15.2	0.69
13:40	879	14.9	4.96	104	15.5	0.65
13:50	893	14.6	4.82	99	15.3	0.60
14:00	924	14.5	4.86	115	15.1	0.67
14:10	946	14.7	5.19	106	15.5	0.66
14:20	908	14.9	5.14	99	15.8	0.65
14:30	886	15.1	5.19	103	15.7	0.67
14:40	995	14.3	5.10	131	15.0	0.75
14:50	1008	14.1	5.06	154	14.0	0.76
15:00	1107	13.5	5.05	138	14.2	0.70
15:10	1024	14.0	5.03	115	14.6	0.62
15:40	994	14.5	5.24	108	15.8	0.71
15:50	951	14.9	5.38	85	15.0	0.49
16:40	1016	15.5	6.34	81	16.0	0.57
16:50	957	14.4	4.98	62	14.7	0.34
17:00	924	14.6	5.00	64	14.8	0.36
17:10	975	14.3	5.00	73	15.3	0.44
17:20	922	14.6	5.00	69	15.6	0.45
17:30	869	15.0	5.04	57	15.5	0.36
17:40	1031	13.8	4.95	72	14.1	0.36
17:50	1028	13.9	4.98	84	14.4	0.44
18:00	973	14.2	4.93	67	14.4	0.35
18:10	1042	13.7	4.94	76	13.8	0.37
18:20	1008	13.7	4.72	71	14.1	0.35
18:30	1023	13.4	4.85	87	14.0	0.43
18:40	1023	13.5	4.67	90	14.2	0.45
18:50	1008	13.6	4.70	92	14.3	0.47
19:00	1022	13.6	4.76	81	13.8	0.39
19:10	1000	13.8	4.75	92	14.5	0.49
19:20	1032	13.6	4.80	78	14.0	0.38
19:30	971	13.9	4.70	89	14.5	0.47
19:40	1037	13.4	4.70	79	13.9	0.39
19:50	1025	13.7	4.79	71	14.1	0.36
20:00	970	14.0	4.76	69	14.3	0.36
20:10	1032	13.6	4.81	93	14.4	0.48
20:20	997	13.9	4.80	83	14.7	0.46
20:30	996	13.9	4.81	87	14.5	0.46
20:40	981	13.9	4.77	81	14.7	0.44
20:50	1058	13.5	4.84	84	14.1	0.42
21:00	1074	13.4	4.84	70	13.9	0.34
21:10	1067	13.4	4.82	84	13.6	0.39
21:20	1072	13.4	4.85	70	14.0	0.34
21:30	1042	13.7	4.88	69	14.2	0.35
21:40	1000	13.9	4.83	65	14.2	0.33
21:50	1016	13.9	4.89	71	14.0	0.35
22:00	1049	13.6	4.90	204	14.5	1.08
22:10	983	14.0	4.86	113	14.8	0.63
22:20	1010	13.9	4.88	120	14.8	0.65
22:30	1005	13.9	4.84	104	14.7	0.57
22:40	1006	13.9	4.88	153	14.6	0.83
22:50	1022	13.9	4.98	71	14.5	0.37
23:00	1005	14.0	4.94	61	14.3	0.31

continued

10 Minute Averages Continued March 19, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
23:10	1001	14.0	4.95	66	14.1	0.33
23:20	1067	13.5	4.90	68	14.1	0.34
23:30	1136	13.1	4.94	81	13.8	0.38
23:40	1156	13.0	4.97	87	13.7	0.41
23:50	1160	13.0	4.99	96	13.4	0.43

10 Minute Averages
March 20, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	1111	12.8	4.67	192	13.7	0.90
00:10	1052	13.3	4.68	136	13.9	0.66
00:20	1102	12.8	4.64	156	13.7	0.74
00:30	1093	12.8	4.60	169	13.7	0.80
00:40	1087	12.9	4.59	116	13.8	0.55
00:50	1037	13.2	4.60	72	13.6	0.33
01:00	1011	13.3	4.53	71	13.7	0.34
01:10	977	13.6	4.58	62	14.0	0.30
01:20	986	13.4	4.48	64	13.8	0.31
01:30	1015	13.2	4.50	54	13.9	0.26
01:40	955	13.7	4.49	280	14.3	1.43
01:50	1024	13.3	4.55	196	14.3	1.01
02:00	972	13.6	4.53	208	14.3	1.07
02:10	1020	13.2	4.51	107	14.2	0.54
02:20	971	13.5	4.44	59	13.9	0.28
02:30	964	13.5	4.45	57	13.8	0.28
02:40	970	13.5	4.44	58	13.8	0.28
02:50	983	14.3	5.05	66	14.4	0.35
03:00	978	14.2	4.95	66	14.3	0.34
03:10	949	14.1	4.73	71	14.2	0.36
03:20	953	14.2	4.82	57	14.4	0.30
03:30	968	14.1	4.83	57	14.4	0.30
03:40	997	14.1	4.97	67	14.4	0.35
04:30	1007	13.6	4.68	78	13.9	0.38
04:40	1045	13.6	4.86	79	14.1	0.40
04:50	1065	13.5	4.88	82	13.7	0.38
05:00	1065	13.5	4.88	85	13.5	0.39
05:10	1079	13.7	5.08	87	13.7	0.41
05:20	1055	14.8	5.87	86	14.8	0.48
05:30	929	15.2	5.53	100	15.0	0.58
06:20	1001	14.6	5.39	91	14.7	0.50
06:30	949	14.8	5.28	81	14.7	0.44
06:40	939	14.6	5.06	86	14.6	0.46
06:50	944	14.5	5.00	65	14.7	0.35
07:00	910	14.6	4.90	52	14.9	0.30
07:40	881	14.4	4.63	44	14.7	0.24
07:50	849	14.7	4.62	26	14.8	0.14
08:00	947	13.8	4.50	57	13.1	0.25
08:10	1095	12.8	4.57	63	12.8	0.27
08:20	1179	12.2	4.62	61	13.5	0.28
08:30	1030	13.6	4.79	72	14.0	0.35
08:40	972	13.9	4.72	70	14.2	0.36
08:50	916	14.1	4.58	63	14.3	0.32
09:00	910	14.6	4.90	52	14.9	0.30
09:20	734	15.6	4.65	31	16.4	0.23
09:30	698	18.1	8.50	23	17.6	0.23
09:40	899	15.4	5.55	33	13.8	0.16
09:50	849	15.8	5.48	31	15.9	0.21
10:00	906	15.4	5.61	43	13.9	0.21
10:10	913	14.7	4.99	36	15.1	0.21
10:40	930	14.1	4.64	35	14.4	0.18
10:50	896	14.4	4.70	32	14.7	0.18
11:00	882	14.4	4.64	29	14.2	0.15
11:10	889	14.8	4.94	41	15.1	0.24
11:20	1070	13.0	4.58	63	13.3	0.28
11:30	1083	13.1	4.71	60	13.2	0.26
11:40	1115	12.9	4.72	66	13.0	0.29
11:50	1080	13.2	4.75	48	14.0	0.24
12:00	1024	13.5	4.67	50	13.6	0.23

continued

10 Minute Averages Continued March 20, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
12:10	1017	13.5	4.64	71	13.6	0.35
12:20	1007	13.4	4.55	58	13.9	0.28
12:30	1022	13.4	4.63	61	13.8	0.29
12:40	1007	13.6	4.70	56	14.3	0.29
12:50	717	15.9	4.83	29	15.7	0.19
13:50	1014	13.6	4.68	73	14.4	0.38
14:00	994	13.9	4.81	78	14.2	0.39
14:10	1037	13.8	4.92	77	13.9	0.37
14:20	980	14.2	4.87	46	14.2	0.23
14:30	991	14.1	4.85	45	14.3	0.23
14:40	964	14.2	4.90	52	14.1	0.26
14:50	960	14.4	4.97	38	14.5	0.20
15:00	918	14.8	5.08	40	14.4	0.21
15:10	926	14.7	5.07	62	14.9	0.35
15:20	902	14.9	5.14	39	15.0	0.22
15:30	903	14.9	5.15	31	14.8	0.17
15:40	898	14.4	4.69	59	14.3	0.30
16:10	873	14.7	4.79	19	15.1	0.11
16:20	1100	13.4	4.98	68	13.9	0.33
16:30	1066	13.8	5.06	77	14.1	0.39
16:40	1127	13.4	5.12	78	14.2	0.39
16:50	1106	13.6	5.13	76	14.1	0.38
17:00	1081	13.8	5.13	47	14.2	0.24
17:10	1076	13.7	5.06	57	14.0	0.28
17:20	1056	14.0	5.22	44	14.2	0.22
17:30	1049	14.1	5.24	43	14.4	0.23
17:40	977	14.6	5.23	41	14.5	0.22
17:50	929	15.0	5.31	39	14.5	0.21
18:00	891	14.5	5.26	36	14.8	0.20
18:10	966	14.6	5.24	32	14.7	0.17
18:20	1014	14.3	5.20	61	15.1	0.36
18:30	973	14.7	5.34	60	15.1	0.35
18:40	1011	14.3	5.19	65	14.8	0.36
18:50	1018	14.3	5.21	45	14.0	0.22
19:00	1125	13.4	5.10	47	13.6	0.22
19:10	994	14.2	5.02	67	14.8	0.37
19:20	984	14.4	5.11	38	14.3	0.20
19:30	1006	14.3	5.14	53	14.4	0.27
19:40	1012	14.2	5.14	34	14.4	0.18
19:50	1002	14.2	5.11	39	14.3	0.20
20:00	1024	14.2	5.15	39	14.3	0.20
20:10	975	14.4	5.11	55	14.9	0.31
20:20	967	14.5	5.13	62	14.7	0.34
20:30	1058	13.8	5.06	62	14.4	0.32
20:40	1031	14.1	5.11	42	13.9	0.21
20:50	1064	13.7	5.02	44	13.9	0.21
21:00	1088	13.6	5.04	84	14.0	0.41
21:10	1119	13.4	5.03	48	13.6	0.23
21:20	1087	13.5	4.98	33	14.3	0.17
21:30	1017	14.1	5.09	54	14.3	0.29
21:40	1011	14.2	5.10	37	14.3	0.18
21:50	1026	14.0	5.03	39	14.4	0.20
22:00	1011	14.2	5.09	36	14.4	0.19
22:10	982	14.4	5.12	41	14.4	0.21
22:20	996	14.3	5.12	56	14.7	0.31
22:30	1012	14.2	5.10	65	14.6	0.35
22:40	992	14.3	5.09	41	14.3	0.21
22:50	923	14.8	5.15	30	15.3	0.18
23:00	859	15.4	5.27	49	16.1	0.35
23:10	904	15.1	5.31	25	15.1	0.15
23:20	889	15.2	5.32	24	15.2	0.14
23:30	854	15.4	5.30	18	15.7	0.12

continued

10 Minute Averages Continued March 20, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	O2 %	E #/mmBtu	Scrubber Outlet SO2 ppm	O2 %	E #/mmBtu
23:40	856	15.4	5.32	29	15.1	0.17
23:50	902	15.0	5.21	26	14.9	0.15

10 Minute Averages
March 21, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	904	14.9	5.14	28	14.9	0.16
00:10	933	14.8	5.16	45	15.2	0.27
00:20	918	14.9	5.15	51	15.0	0.30
00:30	920	14.9	5.19	30	14.9	0.17
00:40	937	14.7	5.16	26	15.3	0.15
00:50	867	15.2	5.17	27	15.2	0.16
01:00	930	14.8	5.17	29	15.0	0.17
01:10	917	14.8	5.13	28	15.0	0.16
01:20	924	14.8	5.13	26	15.2	0.15
01:30	908	14.9	5.13	29	15.0	0.16
01:40	879	15.1	5.16	24	14.9	0.14
01:50	944	14.5	4.98	23	15.0	0.13
02:00	900	14.8	4.99	30	15.0	0.17
02:10	903	14.8	5.04	31	15.2	0.18
02:20	873	15.2	5.17	23	15.3	0.14
02:30	890	14.9	5.06	24	15.2	0.14
02:40	868	15.1	5.05	25	15.0	0.14
02:50	865	15.1	5.05	20	15.3	0.13
03:00	860	15.1	4.99	25	15.1	0.15
03:10	841	15.2	5.00	21	15.2	0.13
03:20	890	14.9	5.03	26	15.0	0.15
03:30	909	14.7	4.94	23	14.8	0.13
03:40	913	14.7	4.97	20	14.9	0.11
03:50	890	14.8	4.94	21	14.9	0.12
04:00	924	14.5	4.89	28	14.7	0.15
04:10	896	14.7	4.88	34	14.7	0.19
04:20	933	14.6	5.00	25	14.8	0.14
04:30	841	15.4	5.17	21	15.2	0.13
04:40	895	14.8	4.98	25	14.8	0.14
04:50	925	14.5	4.91	28	14.8	0.15
05:00	875	15.0	4.99	30	15.0	0.17
05:10	885	14.8	4.93	22	15.3	0.13
05:20	875	14.9	4.98	22	15.0	0.13
05:30	877	15.0	5.08	21	15.4	0.13
05:40	893	15.0	5.15	22	15.2	0.13
05:50	919	14.7	5.04	33	14.7	0.18
06:00	934	14.7	5.08	30	14.7	0.16
06:10	806	15.6	5.14	25	15.3	0.15
06:20	966	14.5	5.10	32	14.8	0.18
06:30	878	15.1	5.11	32	15.2	0.19
06:40	883	15.0	5.11	38	15.2	0.23
06:50	862	15.4	5.27	24	16.2	0.17
07:00	754	16.0	5.20	23	16.1	0.16
07:10	803	15.6	5.13	26	15.8	0.17
07:20	822	15.5	5.15	28	15.7	0.18
07:30	841	15.5	5.23	29	15.6	0.19
07:40	780	16.0	5.33	23	16.4	0.17
07:50	792	15.9	5.37	29	16.0	0.20
08:00	785	15.9	5.37	22	15.9	0.15
08:10	824	15.7	5.32	20	15.8	0.13
08:20	829	15.7	5.37	21	15.8	0.14
08:30	833	15.7	5.41	21	15.8	0.14
08:40	809	15.8	5.39	22	15.9	0.15
08:50	860	15.5	5.40	26	15.6	0.17
09:00	845	15.6	5.36	26	15.7	0.17
09:20	842	15.3	5.10	23	15.5	0.15
09:30	821	15.8	5.42	22	15.6	0.14
09:40	825	15.7	5.43	24	15.8	0.16
09:50	787	16.1	5.54	27	15.8	0.18

continued

10 Minute Averages Continued March 21, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
10:00	795	16.0	5.51	32	15.8	0.21
10:10	782	16.1	5.56	26	16.0	0.18
10:20	778	16.1	5.50	26	16.0	0.18
10:30	833	15.8	5.49	37	15.3	0.22
10:40	899	15.2	5.34	34	15.1	0.20
10:50	906	15.1	5.31	35	15.0	0.20
11:10	848	15.1	4.94	27	15.1	0.16
11:20	902	14.9	5.10	29	14.9	0.16
11:30	930	14.8	5.17	36	14.8	0.20
11:40	942	14.8	5.24	43	14.6	0.23
11:50	935	14.8	5.20	41	14.7	0.22
12:00	849	15.3	5.18	30	15.4	0.18
12:10	847	15.3	5.15	36	15.4	0.22
12:20	847	15.4	5.20	31	15.3	0.19
12:30	798	15.7	5.22	26	16.0	0.18
12:40	728	16.4	5.43	19	16.4	0.14
12:50	726	16.3	5.38	22	15.8	0.15
13:00	792	15.6	5.12	25	15.8	0.16
13:30	741	15.0	4.24	16	15.5	0.10
14:40	628	16.2	4.57	7	16.1	0.05
14:50	423	18.4	5.77	***	16.1	****
15:50	636	16.3	4.74	10	16.3	0.07
16:00	635	16.6	5.03	5	16.5	0.04
16:10	674	16.4	5.13	8	16.2	0.05
16:20	667	16.6	5.23	7	16.4	0.05
16:30	687	16.6	5.36	9	16.5	0.07
16:40	701	16.4	5.24	8	16.4	0.06
16:50	683	16.6	5.42	6	16.7	0.05
17:00	689	16.6	5.43	7	16.7	0.06
17:10	709	16.3	5.27	7	16.7	0.06
17:20	569	17.6	5.83	5	17.5	0.04
17:30	594	17.5	5.88	3	17.8	0.03
17:40	567	17.7	6.01	16	17.9	0.18
17:50	659	17.0	5.77	15	16.8	0.13
18:00	717	16.5	5.46	15	16.5	0.12
18:10	744	16.3	5.45	11	16.5	0.09
18:20	771	16.1	5.50	13	16.4	0.10
18:30	770	16.1	5.46	12	16.5	0.09
18:40	747	16.1	5.29	16	16.4	0.12
18:50	735	16.3	5.45	14	16.6	0.11
19:00	730	16.4	5.55	13	16.6	0.10
19:10	752	16.3	5.59	13	16.7	0.11
19:20	744	16.3	5.45	13	16.6	0.10
19:30	746	16.3	5.53	20	16.4	0.15
19:40	779	16.0	5.39	24	16.3	0.17
19:50	784	16.0	5.44	10	16.5	0.08
20:00	714	16.5	5.44	8	16.7	0.07
20:10	706	16.5	5.47	7	16.7	0.06
20:20	719	16.5	5.56	13	16.3	0.09
20:30	774	15.9	5.28	11	16.4	0.08
20:40	732	16.1	5.19	10	16.4	0.08
20:50	752	16.0	5.26	12	16.4	0.09
21:00	780	16.1	5.47	9	16.2	0.07
21:10	795	15.6	5.12	12	16.1	0.08
21:20	785	15.8	5.20	12	16.1	0.09
21:30	779	15.8	5.18	12	16.1	0.09
21:40	755	15.9	5.11	11	16.1	0.08

10 Minute Averages
March 22, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Sorubber Outlet SO2 ppm	Sorubber Outlet O2 %	Sorubber Outlet E #/mmBtu
00:00	913	14.8	5.08	32	15.2	0.19
00:10	927	14.7	5.11	34	15.2	0.20
00:20	951	14.6	5.13	33	15.0	0.19
00:30	954	14.5	5.08	33	15.2	0.20
00:40	918	14.7	5.05	34	15.5	0.21
00:50	908	14.9	5.11	32	15.3	0.19
01:00	887	15.1	5.17	31	15.4	0.19
01:10	921	14.8	5.15	29	15.3	0.18
01:20	918	14.8	5.12	28	15.3	0.17
01:30	884	15.1	5.17	39	15.8	0.25
01:40	845	15.4	5.22	36	15.4	0.22
01:50	903	15.0	5.16	30	15.6	0.19
02:00	810	15.6	5.19	29	15.7	0.19
02:10	876	15.2	5.18	29	15.6	0.18
02:20	852	15.3	5.19	28	15.8	0.19
02:30	862	15.4	5.35	29	15.6	0.18
02:40	867	15.3	5.24	26	15.9	0.18
02:50	815	15.6	5.26	28	15.8	0.19
03:00	850	15.4	5.23	30	15.7	0.19
03:10	844	15.4	5.25	29	15.7	0.19
03:20	836	15.5	5.27	28	15.8	0.18
03:30	835	15.5	5.26	28	15.7	0.18
03:40	851	15.3	5.18	24	15.8	0.16
03:50	861	15.2	5.15	26	15.6	0.17
04:00	835	15.5	5.29	35	15.6	0.22
04:10	863	15.3	5.20	33	15.3	0.20
04:20	876	15.0	5.07	35	15.1	0.20
04:30	917	14.7	5.05	38	14.9	0.21
04:40	961	14.5	5.07	39	14.9	0.22
04:50	876	15.2	5.19	33	15.4	0.20
05:00	894	15.0	5.12	32	15.3	0.19
05:10	892	15.0	5.09	31	15.4	0.19
05:20	878	15.1	5.17	28	15.3	0.17
05:30	874	15.1	5.13	33	15.4	0.21
05:40	848	15.3	5.09	31	15.7	0.20
05:50	843	15.4	5.21	31	15.6	0.20
06:00	808	15.7	5.22	31	15.8	0.20
06:10	835	15.3	5.05	30	15.6	0.20
06:20	836	15.4	5.18	29	15.7	0.19
06:30	840	15.3	5.13	28	15.8	0.19
06:40	848	15.3	5.15	30	15.5	0.19
06:50	848	15.2	5.05	33	15.5	0.21
07:00	859	15.2	5.08	31	15.5	0.19
07:10	856	15.3	5.17	35	15.5	0.22
07:20	869	15.1	5.11	33	15.5	0.21
07:30	845	15.2	5.04	33	15.6	0.21
07:40	830	15.3	5.04	32	15.6	0.20
07:50	832	15.1	4.89	32	15.5	0.20
08:00	880	15.0	5.05	33	15.2	0.20
08:10	871	15.0	4.98	34	15.2	0.20
08:20	874	15.1	5.08	32	15.4	0.20
08:30	834	15.1	4.90	31	15.5	0.20
08:40	818	15.2	4.89	31	15.6	0.20
08:50	857	15.1	4.99	33	15.5	0.20
09:00	816	15.2	4.90	33	15.5	0.20
09:10	780	15.5	4.89	34	15.6	0.21
09:20	793	15.4	4.90	30	15.7	0.20
09:30	752	15.6	4.84	26	15.9	0.17
09:40	711	15.9	4.87	25	16.1	0.17

continued

10 Minute Averages Continued March 22, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
09:50	759	15.6	4.88	28	16.0	0.18
10:00	708	16.0	4.91	29	15.8	0.19
10:10	742	15.8	4.89	25	15.9	0.17
10:20	759	15.6	4.83	25	15.9	0.17
10:30	807	15.2	4.79	36	14.9	0.21
10:40	924	14.3	4.76	35	14.6	0.19
10:50	861	14.6	4.62	3	14.9	0.02
11:20	866	14.3	4.46	20	15.2	0.12
11:30	807	15.3	4.87	19	15.4	0.12
11:40	757	15.4	4.64	29	15.3	0.17
11:50	785	15.3	4.73	27	15.5	0.17
12:00	786	15.3	4.75	29	15.6	0.18
12:10	766	15.4	4.68	28	15.6	0.18
12:20	761	15.2	4.56	27	15.5	0.17
12:30	723	15.5	4.53	28	15.6	0.18
12:40	698	15.6	4.51	27	15.7	0.18
12:50	666	15.8	4.43	27	15.8	0.18
13:00	680	15.6	4.34	23	15.7	0.15
13:40	674	13.9	3.25	17	14.6	0.09
13:50	631	14.9	3.54	17	15.1	0.10
14:00	619	15.0	3.57	16	15.2	0.10
14:10	587	15.3	3.55	17	15.4	0.10
14:20	588	15.4	3.59	19	15.4	0.12
14:30	639	15.1	3.76	25	15.2	0.15
14:40	680	14.9	3.82	25	15.2	0.15
14:50	671	15.0	3.83	24	15.5	0.15
15:10	642	15.0	3.71	18	15.4	0.11
15:20	681	15.0	3.94	18	15.4	0.11
15:30	698	15.0	3.99	19	15.4	0.12
15:40	674	15.3	4.09	23	15.4	0.14
15:50	651	15.5	4.12	19	15.7	0.12
16:00	646	15.6	4.12	19	15.8	0.12
16:10	673	15.5	4.22	20	15.7	0.13
16:20	680	15.5	4.25	20	15.7	0.13
16:30	680	15.6	4.36	20	16.0	0.14
16:40	670	15.6	4.30	19	15.8	0.13
16:50	642	15.9	4.34	20	16.2	0.14
17:00	723	15.2	4.31	29	15.4	0.18
17:10	739	15.0	4.26	29	15.3	0.17
17:20	717	15.3	4.31	27	15.7	0.18
17:30	715	15.3	4.33	29	15.6	0.18
17:40	686	15.5	4.34	29	15.7	0.19
17:50	703	15.5	4.43	28	15.9	0.19
18:00	729	15.3	4.44	31	15.6	0.20
18:10	750	15.2	4.47	35	15.5	0.22
18:20	730	15.4	4.47	39	15.5	0.25
18:30	747	15.3	4.49	41	15.5	0.26
18:40	657	15.8	4.33	35	15.9	0.24
18:50	665	15.7	4.33	33	15.8	0.22
19:00	670	15.5	4.21	29	15.7	0.19
19:10	713	15.3	4.29	45	15.4	0.28
19:20	678	15.6	4.31	53	15.6	0.34
19:30	627	15.8	4.17	52	16.1	0.37
19:40	581	16.3	4.26	42	16.5	0.33
19:50	603	16.1	4.27	40	16.2	0.29
20:00	640	15.7	4.16	45	15.8	0.30
20:10	627	15.7	4.12	49	16.0	0.34
20:20	607	15.9	4.11	57	16.0	0.39
20:30	587	16.0	4.03	49	16.2	0.36
20:40	540	16.4	4.03	50	16.4	0.37
20:50	640	15.2	3.83	59	15.1	0.34
21:00	625	15.2	3.71	52	15.4	0.32

continued

10 Minute Averages Continued March 22, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	O2 %	E #/mmBtu	Scrubber Outlet SO2 ppm	O2 %	E #/mmBtu
21:10	602	15.4	3.69	46	15.7	0.30
21:20	557	15.9	3.77	55	15.9	0.38
21:30	556	15.9	3.75	60	16.2	0.43
21:40	533	16.1	3.74	62	16.3	0.45
21:50	554	15.9	3.79	62	15.9	0.42
22:00	616	15.3	3.74	62	15.6	0.39
22:10	639	15.1	3.73	74	15.3	0.45
22:20	613	15.4	3.77	88	15.6	0.56
22:30	691	14.9	3.88	121	15.0	0.69
22:40	740	14.7	4.07	116	14.9	0.66
22:50	795	14.5	4.18	102	14.8	0.57
23:00	821	14.4	4.26	117	14.5	0.62
23:10	911	15.4	5.65	157	15.8	1.04
23:20	897	14.1	4.46	163	14.6	0.88
23:30	910	14.2	4.64	140	14.9	0.79
23:40	861	14.6	4.64	154	15.2	0.92
23:50	840	14.8	4.70	164	15.3	0.99

10 Minute Averages
March 23, 1981

Start of 10 Minute Period	Scrubber Inlet			Scrubber Outlet		
	SO2 ppm	O2 %	E #/mmBtu	SO2 ppm	O2 %	E #/mmBtu
00:00	818	15.0	4.69	187	15.2	1.12
00:10	864	14.8	4.78	190	15.1	1.12
00:20	872	14.6	4.72	231	15.1	1.35
00:30	857	14.8	4.77	206	15.1	1.20
00:40	851	14.8	4.74	181	15.4	1.11
00:50	831	15.0	4.81	166	15.5	1.04
01:00	815	15.1	4.76	142	15.5	0.90
01:10	795	15.1	4.67	177	15.5	1.12
01:20	780	15.3	4.72	159	15.6	1.02
01:30	749	15.4	4.63	166	15.7	1.08
01:40	709	15.7	4.62	123	16.0	0.84
01:50	677	15.8	4.47	113	16.2	0.82
02:00	650	16.0	4.49	113	16.2	0.81
02:10	666	15.8	4.46	120	15.9	0.82
02:20	639	15.8	4.27	141	16.0	0.99
02:30	576	16.3	4.26	131	16.4	0.98
02:40	657	15.6	4.17	157	15.7	1.02
02:50	668	15.5	4.16	155	15.8	1.03
03:00	630	15.7	4.15	152	15.9	1.02
03:10	628	15.7	4.11	161	15.8	1.08
03:20	655	15.4	4.06	190	15.8	1.26
03:30	653	15.5	4.08	172	15.6	1.11
03:40	654	15.4	4.00	170	15.7	1.12
03:50	670	15.3	4.07	165	15.2	0.99
04:00	685	15.2	4.04	158	15.4	0.98
04:10	686	15.1	4.03	153	15.5	0.96
04:20	672	15.3	4.07	165	15.6	1.06
04:30	690	15.2	4.09	168	15.2	0.99
04:40	761	14.4	4.00	189	14.7	1.03
04:50	763	14.3	3.91	196	14.4	1.03
05:00	798	13.9	3.89	204	14.6	1.11
05:10	710	14.6	3.85	180	15.2	1.07
05:20	707	14.7	3.84	209	15.0	1.20
05:30	692	14.9	3.91	202	15.4	1.24
05:40	701	14.9	3.96	212	15.2	1.26
05:50	683	15.1	3.99	203	15.2	1.21
06:00	681	14.8	3.76	207	15.1	1.21
06:10	711	14.5	3.79	206	15.0	1.19
06:20	653	14.9	3.68	203	14.9	1.15
06:30	669	14.7	3.64	250	14.9	1.41
06:40	706	14.3	3.66	252	14.7	1.38
06:50	706	14.4	3.66	254	14.7	1.40
07:00	535	15.9	3.67	198	16.1	1.40
07:10	528	16.0	3.68	208	16.2	1.50
07:20	536	15.9	3.61	223	15.9	1.52
07:30	563	15.7	3.67	205	16.0	1.41
07:40	609	15.5	3.86	48	15.7	0.32
07:50	596	15.7	3.85	275	10.9	0.93
08:00	421	13.8	2.02	10	21.1	****
08:10	532	15.6	3.40	106	15.6	0.68
08:20	586	15.4	3.61	124	15.5	0.78
08:30	625	15.5	3.93	120	15.5	0.76
10:30	913	16.4	6.88	75	16.4	0.57
10:40	841	15.5	5.28	81	15.7	0.53
10:50	731	16.0	5.06	106	16.0	0.73
11:00	750	16.0	5.19	72	16.0	0.50
11:10	764	15.9	5.18	71	16.0	0.49
11:20	767	16.9	6.51	82	17.1	0.73
11:30	734	17.1	6.49	78	17.3	0.73

continued

10 Minute Averages Continued March 23, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
11:40	764	16.8	6.30	80	17.2	0.73
11:50	745	16.9	6.36	79	17.2	0.72
12:00	727	16.9	6.24	82	17.0	0.72
12:10	741	16.8	6.16	85	17.1	0.77
12:20	714	17.1	6.38	84	17.2	0.77
12:30	716	17.1	6.38	79	17.2	0.72
12:40	683	15.9	4.63	79	15.9	0.54
12:50	654	16.0	4.53	70	16.0	0.49
14:20	600	17.7	6.31	41	18.0	0.47
14:30	574	18.1	6.85	24	20.7	3.52
14:40	517	18.5	7.46	34	18.5	0.47
15:00	633	18.2	7.92	55	17.2	0.51
15:10	677	17.7	7.20	64	17.3	0.60
15:20	668	17.7	7.04	66	17.2	0.61
15:30	701	17.5	7.09	73	17.1	0.65
15:40	719	18.0	8.30	83	16.8	0.69
15:50	712	17.8	7.87	74	16.8	0.62
16:00	741	17.7	7.82	64	17.0	0.55
16:10	690	17.6	7.10	60	17.2	0.55
16:20	689	17.7	7.21	42	17.3	0.40
16:30	650	18.0	7.57	36	17.5	0.36
16:40	636	18.4	8.79	31	17.8	0.34
16:50	644	16.4	4.85	34	16.4	0.25
17:20	625	17.2	5.73	49	16.8	0.40
17:30	630	17.0	5.55	52	16.9	0.43
17:40	627	17.4	6.03	60	16.8	0.50
17:50	665	17.1	5.87	61	16.9	0.52
18:00	610	17.0	5.29	60	17.1	0.54
18:10	622	17.3	5.88	66	16.9	0.55
18:20	637	17.2	5.86	70	16.7	0.57
18:30	661	17.0	5.72	76	16.7	0.61
18:40	673	17.0	5.88	75	16.8	0.62
18:50	621	17.7	6.52	72	16.9	0.61
19:00	680	17.3	6.40	80	16.8	0.66
19:10	684	17.4	6.59	80	16.8	0.66
19:20	696	17.0	6.06	98	16.6	0.78
19:30	686	16.8	5.69	97	16.7	0.78
19:40	716	16.9	6.14	91	16.8	0.76
19:50	670	17.6	6.91	65	17.6	0.68
20:00	585	18.2	7.40	63	17.6	0.65
20:10	648	17.8	7.18	123	16.3	0.91
20:20	787	16.6	6.13	103	16.9	0.87
20:30	703	17.2	6.42	94	16.9	0.79
20:40	800	16.4	6.04	117	16.3	0.86
20:50	898	16.2	6.54	173	15.5	1.09
21:00	921	16.1	6.53	110	16.4	0.82
21:10	661	17.7	6.91	78	17.2	0.71
21:20	672	17.2	6.19	106	16.5	0.81
21:30	744	16.6	5.89	111	16.3	0.82
21:40	750	16.8	6.15	119	16.2	0.86
21:50	818	16.6	6.46	139	15.9	0.95
22:00	726	17.2	6.68	108	16.4	0.81
22:10	824	16.6	6.58	127	16.2	0.91
22:20	758	16.6	6.04	96	16.8	0.79
22:30	759	16.8	6.23	110	16.7	0.89
22:40	728	16.9	6.23	95	16.0	0.66
22:50	722	17.3	6.82	88	16.7	0.71
23:00	689	17.7	7.28	80	16.8	0.66
23:10	737	17.3	7.03	76	17.2	0.68
23:20	694	17.3	6.47	80	16.9	0.68
23:30	708	17.3	6.63	79	16.9	0.67
23:40	734	17.4	7.02	108	16.4	0.81

continued

10 Minute Averages Continued March 23, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	O2 %	E #/mmBtu	Scrubber Outlet SO2 ppm	O2 %	E #/mmBtu
23:50	750	17.2	6.89	90	18.0	1.07

10 Minute Averages
March 24, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	733	17.7	7.67	77	19.1	1.44
00:10	712	17.5	7.05	74	21.5	****
00:20	714	17.4	6.91	76	20.2	3.79
00:30	686	17.6	6.98	71	19.7	1.99
00:40	654	17.8	7.17	61	20.6	6.77
00:50	688	18.0	8.06	61	17.9	0.69
01:00	666	18.1	8.14	63	17.4	0.61
01:10	867	16.9	7.28	113	16.2	0.82
01:20	816	16.7	6.65	112	16.3	0.82
01:30	811	16.7	6.53	104	16.3	0.77
01:40	774	16.9	6.60	98	16.6	0.77
01:50	811	17.0	7.11	105	16.4	0.79
02:00	756	17.3	7.20	100	16.4	0.76
02:10	776	17.2	7.09	101	16.3	0.74
02:20	822	16.5	6.40	119	16.0	0.82
02:30	852	16.3	6.32	143	15.9	0.98
02:40	805	16.5	6.16	135	16.0	0.93
02:50	815	16.8	6.76	121	15.9	0.83
03:00	786	16.9	6.75	115	16.0	0.80
03:10	801	16.7	6.51	111	15.9	0.76
03:20	791	16.3	5.83	100	15.9	0.68
03:30	772	16.5	6.00	92	16.1	0.65
03:40	781	16.4	5.90	98	16.0	0.69
03:50	820	16.7	6.57	124	15.6	0.79
04:00	868	16.3	6.37	139	15.4	0.86
04:10	872	16.3	6.36	145	15.3	0.88
04:20	704	17.0	6.15	80	16.8	0.65
04:30	706	17.0	6.17	81	16.6	0.64
04:40	697	17.1	6.19	75	16.7	0.61
04:50	685	17.6	7.09	67	16.9	0.57
05:00	659	17.7	6.94	65	16.9	0.56
05:10	692	17.5	6.98	76	16.8	0.62
05:20	660	17.4	6.34	66	17.1	0.58
05:30	690	17.2	6.34	73	16.9	0.62
05:40	671	17.3	6.24	67	17.0	0.59
05:50	649	17.7	6.95	76	17.3	0.71
06:00	665	17.6	6.88	86	17.0	0.76
06:10	692	17.4	6.64	95	17.0	0.83
06:20	647	17.4	6.22	66	17.1	0.59
06:30	666	17.2	6.12	106	16.2	0.77
06:40	768	16.5	5.93	101	16.4	0.76
06:50	734	16.9	6.21	104	16.3	0.77
07:00	720	17.1	6.44	92	16.4	0.69
07:10	761	16.8	6.36	98	16.4	0.74
07:20	773	16.4	5.87	102	16.3	0.74
07:30	747	16.5	5.82	91	16.4	0.69
07:40	711	16.8	5.86	88	16.4	0.67
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
08:00	773	16.7	6.30	100	16.1	0.70
08:10	749	16.7	6.08	103	16.0	0.72
08:20	817	16.0	5.60	130	15.6	0.83
08:30	817	15.9	5.54	111	16.0	0.77
08:40	820	15.4	5.06	133	15.5	0.84
08:50	841	15.4	5.19	136	15.5	0.86
09:50	669	15.5	4.21	85	16.2	0.61
10:00	655	16.2	4.71	87	16.3	0.64
10:10	682	16.3	5.03	92	16.4	0.69
10:20	663	16.4	5.00	92	16.5	0.71
10:30	606	16.8	5.05	77	16.9	0.66

continued

10 Minute Averages Continued March 24, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
10:40	601	17.0	5.23	68	17.0	0.59
10:50	625	17.2	5.73	77	17.1	0.69
11:10	659	16.3	4.86	77	16.3	0.57
11:20	663	16.2	4.78	78	16.5	0.60
11:30	659	16.2	4.76	80	16.5	0.62
11:40	673	16.5	5.19	78	16.5	0.60
11:50	693	15.6	4.42	97	15.8	0.64
12:00	721	16.2	5.20	84	16.2	0.61
12:10	755	15.8	5.02	82	15.8	0.54
13:00	624	15.7	4.11	41	16.1	0.29
13:10	626	16.2	4.54	43	16.2	0.31
13:20	636	16.2	4.59	44	16.3	0.32
13:30	634	16.3	4.71	37	16.5	0.29
13:40	649	16.4	4.86	42	16.4	0.32
13:50	629	16.4	4.72	39	16.4	0.30
14:00	613	16.4	4.58	38	16.6	0.30
14:10	630	16.4	4.72	34	16.5	0.27
14:20	619	16.4	4.65	36	16.5	0.28
14:30	596	16.7	4.86	38	16.7	0.31
14:40	571	16.9	4.87	34	16.9	0.29
14:50	615	16.7	4.97	29	16.7	0.23
15:00	635	17.0	5.52	31	17.0	0.27
15:10	548	16.9	4.67	25	17.3	0.23
15:20	529	17.5	5.21	23	17.5	0.23
15:30	533	17.5	5.31	22	17.4	0.22
15:40	533	17.5	5.33	23	17.2	0.21
15:50	552	17.3	5.14	20	17.2	0.18
16:00	535	17.5	5.29	23	17.0	0.20
16:10	585	17.0	5.11	22	16.9	0.18
16:20	635	16.6	4.98	28	16.3	0.21
16:30	661	16.3	4.89	29	16.5	0.23
16:40	646	16.5	4.95	29	16.4	0.22
16:50	659	16.3	4.89	30	16.5	0.23
17:00	657	16.5	5.01	11	16.2	0.08
17:30	660	15.5	4.16	34	16.0	0.23
17:40	633	16.4	4.72	38	16.5	0.30
17:50	622	16.6	4.89	41	16.6	0.33
18:00	646	16.4	4.89	47	16.5	0.36
18:10	623	16.7	5.02	45	16.7	0.37
18:20	667	16.4	5.00	51	16.5	0.39
18:30	691	16.2	4.94	53	16.4	0.40
18:40	706	16.0	4.92	61	16.3	0.45
18:50	672	16.2	4.89	59	16.5	0.45
19:00	666	16.3	4.94	60	16.4	0.45
19:10	616	16.6	4.87	48	16.8	0.40
19:20	630	16.6	4.97	51	16.5	0.39
19:30	676	16.2	4.92	48	16.4	0.36
19:40	623	16.7	5.02	50	16.5	0.39
19:50	715	15.9	4.84	61	16.1	0.43
20:00	717	15.9	4.88	70	15.9	0.47
20:10	775	15.4	4.77	79	15.4	0.49
20:20	703	15.9	4.80	60	16.2	0.43
20:30	715	15.9	4.81	57	16.1	0.40
20:40	697	16.0	4.80	59	16.1	0.42
20:50	670	16.2	4.84	55	16.3	0.41
21:00	697	16.1	4.88	54	16.3	0.39
21:10	686	16.1	4.85	55	16.2	0.40
21:20	669	16.3	4.90	50	16.5	0.38
21:30	634	16.6	5.04	43	16.7	0.35
21:40	661	16.4	4.94	41	16.8	0.34
21:50	642	16.6	5.01	47	16.3	0.35
22:00	670	16.3	4.95	48	16.2	0.34

continued

10 Minute Averages Continued March 24, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	O2 %	E #/mmBtu	Scrubber Outlet SO2 ppm	O2 %	E #/mmBtu
22:10	750	15.7	4.89	67	16.0	0.46
22:20	726	15.9	4.93	60	16.2	0.43
22:30	657	16.5	5.02	57	16.5	0.44
22:40	661	16.5	5.07	51	16.6	0.40
22:50	573	17.2	5.21	38	17.1	0.34
23:00	751	15.7	4.89	72	15.8	0.48
23:10	756	15.5	4.71	73	15.9	0.50
23:20	656	16.3	4.88	62	16.3	0.45
23:30	703	15.9	4.81	77	16.3	0.56
23:40	711	15.8	4.77	80	16.2	0.57
23:50	720	15.7	4.71	69	15.9	0.46

10 Minute Averages
March 25, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	720	15.7	4.70	77	15.9	0.52
00:10	715	15.7	4.65	63	15.9	0.43
00:20	715	15.7	4.62	60	16.0	0.42
00:30	663	16.0	4.63	53	16.0	0.37
00:40	731	15.5	4.60	64	15.5	0.40
00:50	749	15.4	4.64	70	15.5	0.44
01:00	768	15.3	4.63	83	15.6	0.53
01:10	767	15.3	4.63	72	15.5	0.45
01:20	770	15.3	4.63	79	15.6	0.51
01:30	747	15.4	4.64	74	15.5	0.46
01:40	769	15.4	4.78	77	15.7	0.51
01:50	741	15.5	4.65	77	15.8	0.52
02:00	724	15.7	4.68	75	15.8	0.50
02:10	740	15.5	4.66	91	15.8	0.60
02:20	727	15.7	4.71	77	16.3	0.57
02:30	639	16.3	4.66	69	16.3	0.51
02:40	635	16.4	4.73	58	16.6	0.45
02:50	625	16.6	4.90	52	16.7	0.42
03:00	635	16.4	4.81	47	16.4	0.35
03:10	665	16.2	4.79	45	16.3	0.33
03:20	634	16.4	4.76	55	16.5	0.43
03:30	640	16.4	4.80	48	16.3	0.35
03:40	668	16.2	4.85	45	16.3	0.33
03:50	644	16.3	4.78	44	16.3	0.33
04:00	680	16.1	4.77	48	16.3	0.35
04:10	658	16.3	4.80	45	16.4	0.34
04:20	640	16.4	4.83	42	16.5	0.32
04:30	659	16.2	4.77	49	16.5	0.38
04:40	682	16.0	4.70	63	16.2	0.46
04:50	706	15.9	4.74	82	16.0	0.56
05:00	728	15.7	4.72	92	15.7	0.61
05:10	768	15.5	4.79	64	15.7	0.42
05:20	797	15.2	4.71	51	15.3	0.31
05:30	739	15.5	4.67	45	15.7	0.30
05:40	747	15.5	4.71	46	15.7	0.30
05:50	715	15.7	4.65	50	15.8	0.33
06:00	714	15.8	4.74	48	15.8	0.32
06:10	705	15.8	4.68	45	15.8	0.30
06:20	718	15.7	4.68	45	16.0	0.31
06:30	692	16.0	4.80	39	16.0	0.27
06:40	666	16.1	4.75	37	16.3	0.28
06:50	649	16.3	4.73	40	16.3	0.29
07:00	648	16.4	4.84	35	16.4	0.26
07:10	607	16.7	4.85	57	16.6	0.45
07:20	616	16.5	4.71	85	16.3	0.63
07:30	673	16.0	4.63	59	16.4	0.45
07:40	722	15.6	4.59	44	15.4	0.27
07:50	763	15.2	4.52	47	15.3	0.29
08:00	764	15.2	4.53	45	15.3	0.28
08:10	735	15.3	4.42	39	15.7	0.25
08:20	720	15.5	4.51	40	15.5	0.25
08:30	728	15.5	4.60	41	15.7	0.26
08:40	731	15.6	4.67	42	15.8	0.28
08:50	735	15.6	4.67	39	15.8	0.26
09:00	755	15.8	5.02	38	16.1	0.27
09:10	765	16.0	5.30	39	16.3	0.29
09:20	789	16.2	5.69	34	16.3	0.25
09:30	669	15.5	4.21	25	15.7	0.16
09:40	721	15.7	4.67	27	15.7	0.18

continued

10 Minute Averages Continued March 25, 1981

Start of 10 Minute Period	Scrubber Inlet			Scrubber Outlet		
	SO2 ppm	O2 %	E #/mmBtu	SO2 ppm	O2 %	E #/mmBtu
09:50	739	15.7	4.84	28	15.9	0.19
10:00	685	16.2	4.95	36	16.2	0.26
10:10	682	16.3	5.00	37	16.4	0.28
10:20	669	16.4	5.01	41	16.2	0.30
10:30	707	16.1	4.98	45	16.2	0.32
10:40	691	16.3	5.10	34	16.1	0.24
10:50	711	16.1	5.02	37	16.1	0.26
11:00	706	16.4	5.32	42	17.0	0.36
11:10	607	17.4	5.88	34	17.3	0.32
11:20	592	17.0	5.15	30	17.0	0.26
11:30	627	17.0	5.45	33	16.8	0.28
11:40	661	17.0	5.75	31	17.0	0.27
11:50	653	15.9	4.41	31	16.3	0.23
12:00	659	16.2	4.75	38	16.3	0.27
12:10	670	16.3	4.89	35	16.3	0.26
12:20	662	16.2	4.77	39	16.3	0.29
12:30	670	16.2	4.88	37	16.4	0.28
12:40	646	16.4	4.83	36	16.6	0.28
12:50	676	16.9	5.73	31	17.0	0.27
13:00	691	17.0	6.01	28	17.0	0.24
13:30	597	16.3	4.40	18	16.9	0.15
13:40	601	17.1	5.29	16	17.4	0.16
13:50	588	17.5	5.88	17	17.6	0.17
14:00	574	17.6	5.98	17	17.7	0.18
14:10	567	17.7	6.05	18	17.8	0.20
14:20	572	17.8	6.24	24	17.7	0.25
14:30	580	17.8	6.37	25	17.7	0.27
14:40	597	17.7	6.33	26	17.7	0.28
14:50	578	17.8	6.33	32	17.5	0.31
15:00	575	17.7	6.03	25	17.5	0.25
15:10	597	17.4	5.76	25	17.6	0.26
15:20	583	17.5	5.90	5	17.5	0.05
15:30	632	17.2	5.79	23	17.3	0.22
15:40	597	17.3	5.62	27	17.4	0.26
16:00	570	17.1	5.11	***	17.2	****
16:10	557	17.6	5.69	6	17.2	0.05
16:20	531	17.6	5.44	17	17.5	0.17
16:30	547	17.4	5.28	19	17.2	0.18
16:40	523	17.6	5.37	12	17.9	0.14
16:50	444	18.3	5.83	***	17.5	****
17:00	501	17.9	5.67	17	17.9	0.20
17:10	507	17.9	5.77	16	17.9	0.18
17:20	501	17.9	5.72	19	17.8	0.21
17:30	517	17.8	5.68	21	17.6	0.22
17:40	507	17.9	5.71	22	17.7	0.23
17:50	542	17.7	5.70	23	17.5	0.23
18:00	566	17.5	5.69	24	17.6	0.25
18:10	557	17.5	5.61	27	17.3	0.26

10 Minute Averages
March 26, 1981

Start of 10 Minute Period	Scrubber Inlet			Scrubber Outlet		
	SO2 ppm	O2 %	E #/mmBtu	SO2 ppm	O2 %	E #/mmBtu
00:40	611	17.3	5.78	22	18.2	0.27
00:50	638	17.8	6.88	23	18.5	0.32
01:00	664	17.8	7.18	28	18.3	0.37
01:10	677	17.7	7.21	29	18.2	0.37
01:20	643	17.8	7.15	24	18.4	0.33
01:30	680	17.7	7.12	30	17.9	0.34
01:40	661	17.8	7.16	22	18.2	0.28
01:50	669	17.8	7.37	27	18.1	0.32
02:00	691	17.6	7.20	25	18.1	0.30
02:10	569	18.8	9.15	7	20.7	1.24
02:20	587	18.7	9.08	21	18.8	0.34
02:30	571	18.8	9.01	25	19.1	0.45
02:40	581	18.7	9.15	22	19.2	0.42
02:50	575	18.8	9.11	24	19.2	0.47
03:00	586	18.7	9.04	21	19.0	0.38
03:10	571	18.8	9.33	22	19.0	0.39
03:20	570	18.9	9.60	25	19.2	0.50
03:30	557	19.0	10.04	24	19.2	0.49
03:40	570	18.9	9.52	26	19.1	0.48
03:50	588	18.7	9.07	25	19.0	0.44
04:00	591	18.7	9.01	27	18.7	0.42
04:10	575	18.8	9.09	29	18.7	0.44
04:20	608	18.4	8.27	27	18.7	0.42
04:30	599	18.4	8.28	27	18.7	0.42
04:40	591	18.6	8.56	26	18.7	0.40
04:50	573	18.6	8.51	25	18.8	0.40
05:00	609	18.5	8.47	29	18.6	0.43
05:10	590	18.6	8.54	29	18.8	0.47
05:20	522	19.3	10.99	27	19.1	0.51
05:30	575	18.7	8.79	29	18.8	0.48
05:40	571	18.7	8.86	27	19.0	0.49
05:50	579	18.6	8.58	29	18.8	0.47
06:00	618	18.3	8.17	31	18.6	0.45
06:10	641	18.2	7.94	32	18.6	0.47
06:20	627	18.2	7.86	35	18.5	0.50
06:30	639	18.1	7.64	36	18.4	0.49
06:40	634	18.2	7.83	34	18.2	0.42
06:50	630	18.1	7.71	31	18.1	0.37
07:00	681	17.6	7.07	35	18.0	0.41
07:10	674	17.7	7.18	36	18.2	0.46
07:20	694	17.6	7.06	36	17.8	0.39
07:30	708	17.3	6.74	37	17.6	0.38
07:40	742	17.1	6.59	45	18.0	0.52
07:50	727	17.2	6.71	79	18.5	1.11
08:00	708	17.4	6.89	203	19.0	3.62
08:10	718	17.2	6.53	14	21.7	****
08:20	708	17.5	7.15	37	18.0	0.43
08:30	690	17.6	7.05	45	17.9	0.51
08:40	710	17.6	7.21	49	17.8	0.54
08:50	709	17.5	7.02	53	17.3	0.51
09:00	737	17.2	6.74	55	17.5	0.55
09:10	733	17.3	6.98	55	17.7	0.58
09:20	749	17.2	6.79	55	17.9	0.63
09:30	703	17.7	7.49	55	18.0	0.64
09:40	691	17.8	7.63	52	18.2	0.64
09:50	702	17.8	7.73	55	18.0	0.64
10:00	696	17.8	7.67	59	18.0	0.70
10:10	725	17.8	7.81	58	18.2	0.72
10:20	603	15.9	4.09	49	16.0	0.34

continued

10 Minute Averages Continued March 26, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
10:30	589	15.9	4.00	52	16.0	0.36
10:40	627	15.9	4.25	50	16.0	0.35
11:00	635	16.4	4.74	29	16.9	0.25
11:10	613	17.2	5.69	31	17.4	0.30
11:20	611	17.3	5.79	33	17.4	0.32
11:30	619	17.0	5.41	34	17.1	0.30
11:40	641	16.8	5.33	30	17.1	0.27
11:50	641	16.8	5.36	30	17.2	0.27
12:00	646	16.8	5.36	32	17.1	0.28
12:10	640	16.9	5.47	28	17.0	0.24
12:20	644	16.9	5.40	25	17.1	0.22
12:30	650	16.7	5.30	30	16.8	0.25
12:40	653	16.7	5.25	26	16.8	0.21
12:50	649	16.7	5.25	22	16.8	0.19
13:00	658	16.7	5.28	19	16.9	0.16
13:10	644	16.7	5.15	19	16.8	0.16
13:20	662	16.5	5.14	15	16.9	0.13
13:30	646	16.7	5.21	20	16.8	0.17
13:40	637	16.8	5.27	20	16.9	0.17
13:50	694	16.8	5.74	15	16.8	0.13
14:00	646	16.8	5.34	14	16.8	0.12
14:10	627	16.9	5.32	18	16.9	0.16
14:20	637	16.8	5.27	18	16.9	0.15
14:30	613	16.6	4.84	15	16.7	0.12
14:40	598	16.7	4.83	18	16.7	0.14
14:50	569	16.7	4.60	15	16.8	0.12
15:00	531	16.8	4.39	12	16.8	0.10
16:30	594	16.9	5.05	15	21.6	****
16:40	617	17.1	5.44	30	17.0	0.26
16:50	634	17.0	5.50	1	17.0	0.01
17:00	614	17.1	5.43	29	17.1	0.26
17:10	622	17.0	5.45	28	17.1	0.25
17:20	617	17.0	5.40	27	16.9	0.23
17:30	640	16.8	5.32	30	16.9	0.25
17:40	630	16.9	5.38	31	16.8	0.26
17:50	658	16.7	5.35	32	16.9	0.27
18:00	662	16.7	5.39	32	16.9	0.28
18:10	616	17.1	5.45	30	17.1	0.26
18:20	621	17.0	5.39	31	17.0	0.27
18:30	617	17.1	5.50	30	17.2	0.28
18:40	607	17.2	5.54	29	17.3	0.27
18:50	580	17.4	5.65	27	17.5	0.27
19:00	589	17.4	5.68	25	17.6	0.26
19:10	581	17.4	5.70	25	17.7	0.26
19:20	521	18.0	6.13	24	18.0	0.28
19:30	553	17.7	5.85	25	17.7	0.26
19:40	534	17.8	5.88	23	17.8	0.26
19:50	523	17.9	5.99	24	17.8	0.26
20:00	533	17.9	5.86	22	17.7	0.24
20:10	551	17.6	5.67	23	17.5	0.23
20:20	583	17.3	5.56	22	17.4	0.22
20:30	575	17.5	5.73	19	17.8	0.20
20:40	502	18.1	6.12	23	17.1	0.21
20:50	652	16.7	5.27	25	16.8	0.20
21:00	628	16.9	5.30	23	17.1	0.20
21:10	578	17.3	5.43	21	17.4	0.21
21:20	577	17.3	5.41	19	17.2	0.18
21:30	593	17.2	5.37	21	17.0	0.18
21:40	633	16.8	5.29	20	17.0	0.17
21:50	617	17.0	5.31	20	17.0	0.17
22:00	636	16.7	5.13	23	16.7	0.18
22:10	624	16.7	5.08	21	16.9	0.18

continued

10 Minute Averages Continued March 26, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
22:20	579	16.4	4.36	25	16.4	0.19
22:30	589	16.6	4.65	21	16.8	0.17
22:40	627	17.3	5.81	16	17.3	0.15
22:50	613	16.8	5.07	18	16.7	0.14
23:00	589	16.8	4.87	21	16.8	0.17
23:10	531	16.7	4.29	23	16.7	0.19
23:20	559	16.8	4.62	26	16.7	0.21
23:30	560	16.7	4.52	23	16.7	0.19
23:40	545	16.7	4.40	24	16.7	0.19
23:50	531	16.8	4.39	23	16.8	0.19

10 Minute Averages
March 27, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:30	507	18.1	6.21	14	18.1	0.17
00:40	516	18.1	6.18	15	18.0	0.17
00:50	511	18.1	6.15	16	17.9	0.18
01:00	497	18.2	6.21	15	18.1	0.18
01:10	498	18.2	6.24	20	17.5	0.20
01:20	588	17.3	5.60	20	17.5	0.20
01:30	545	17.7	5.73	20	17.6	0.21
01:40	574	17.5	5.80	18	17.7	0.19
01:50	539	17.8	5.81	19	17.7	0.20
02:00	566	17.5	5.67	20	17.5	0.20
02:10	584	17.3	5.56	21	17.4	0.20
02:20	592	17.3	5.57	21	17.4	0.20
02:30	591	17.3	5.60	22	17.5	0.22
02:40	588	17.4	5.63	24	17.3	0.23
02:50	611	17.1	5.52	24	17.3	0.23
03:00	618	17.1	5.58	25	17.2	0.23
03:10	629	17.0	5.48	26	17.0	0.23
03:20	643	16.8	5.38	27	17.0	0.24
03:30	674	16.7	5.43	31	16.7	0.25
03:40	728	16.3	5.32	34	16.2	0.24
03:50	715	16.3	5.22	34	16.3	0.25
04:00	755	15.9	5.08	40	16.0	0.28
04:10	646	16.7	5.25	21	17.5	0.20
04:20	553	17.6	5.65	23	17.5	0.23
04:30	562	17.6	5.83	20	17.7	0.21
04:40	549	17.7	5.89	20	17.7	0.21
04:50	516	18.0	6.01	16	17.9	0.19
05:00	567	17.6	5.76	23	17.4	0.23
05:10	553	17.8	5.96	22	17.7	0.23
05:20	560	17.6	5.83	18	17.9	0.21
05:30	505	18.1	6.10	16	18.1	0.19
05:40	477	18.4	6.37	18	18.0	0.21
05:50	515	18.0	6.03	18	17.9	0.21
06:00	460	18.5	6.58	16	18.3	0.21
06:10	475	18.3	6.31	16	18.2	0.19
06:20	469	18.4	6.33	17	18.3	0.22
06:30	489	18.2	6.24	20	18.1	0.24
06:40	505	18.1	6.13	19	18.1	0.23
06:50	521	17.9	5.97	20	17.8	0.22
07:00	572	17.5	5.78	20	17.4	0.19
07:10	572	17.5	5.72	20	17.5	0.20
07:20	577	17.4	5.67	20	17.4	0.19
07:30	597	17.3	5.57	29	16.6	0.23
07:40	702	16.4	5.31	33	16.4	0.25
07:50	712	16.4	5.36	35	16.6	0.27
08:00	706	16.3	5.24	40	16.2	0.29
08:10	722	16.2	5.25	44	16.9	0.37
08:20	624	17.0	5.48	42	17.0	0.36
08:30	687	16.5	5.33	48	16.5	0.37
10:00	610	15.1	3.59	41	15.8	0.27
10:10	582	16.0	4.03	37	15.8	0.25
10:20	608	16.0	4.22	32	16.3	0.23
10:30	562	16.3	4.18	30	16.4	0.22
10:40	672	15.5	4.20	42	15.7	0.27
10:50	705	15.3	4.27	46	15.6	0.29
11:00	666	15.8	4.43	43	16.1	0.30
11:10	644	15.9	4.36	44	15.9	0.30
11:20	696	15.5	4.37	48	15.6	0.31
11:30	728	15.4	4.48	49	16.1	0.35

continued

10 Minute Averages Continued March 27, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	O2 %	E #/mmBtu	Scrubber Outlet SO2 ppm	O2 %	E #/mmBtu
11:40	617	16.3	4.56	41	16.5	0.32
11:50	641	16.4	4.80	45	16.4	0.34
12:00	674	16.1	4.80	44	16.6	0.34
12:10	618	16.5	4.78	47	16.4	0.35
12:20	673	16.1	4.72	48	16.3	0.35
12:30	664	16.2	4.78	46	16.4	0.35
12:40	619	16.6	4.84	34	16.8	0.28
12:50	584	16.9	4.91	41	16.4	0.31
13:00	609	16.6	4.80	40	16.7	0.32
13:10	616	16.5	4.77	42	16.6	0.33
13:20	605	16.7	4.84	38	16.9	0.32
13:30	569	17.0	4.89	39	16.9	0.33
13:40	599	16.8	4.94	39	16.7	0.31
13:50	608	16.7	4.95	36	17.1	0.31
14:00	574	17.1	5.10	36	17.0	0.31
14:10	567	17.0	4.90	42	17.1	0.37
14:20	551	17.2	5.12	36	17.3	0.34
14:30	621	16.6	4.94	45	16.7	0.36
14:40	674	16.3	4.97	44	16.5	0.34
14:50	672	16.3	4.96	41	16.2	0.29
15:00	760	15.6	4.90	57	15.9	0.39
15:10	719	15.8	4.74	67	16.0	0.46
15:20	743	15.7	4.85	63	16.0	0.44
15:30	694	16.0	4.77	55	16.2	0.39
15:40	718	15.8	4.77	55	16.0	0.39
15:50	703	15.9	4.80	48	15.7	0.31
16:00	778	15.2	4.67	51	15.4	0.32
16:50	632	16.3	4.70	47	16.3	0.35
17:00	626	16.3	4.64	43	16.3	0.31
17:10	635	16.1	4.50	43	16.2	0.31
17:20	610	16.3	4.50	44	16.2	0.32
17:30	651	16.1	4.57	33	16.4	0.25
17:40	618	16.3	4.61	34	16.3	0.25
17:50	619	16.3	4.59	34	16.4	0.25
18:00	608	16.2	4.40	38	16.3	0.28
18:10	601	16.2	4.36	40	16.1	0.28
18:20	627	16.1	4.39	40	16.2	0.29
18:30	579	16.5	4.42	37	16.3	0.27
18:40	593	16.3	4.41	29	16.4	0.22
18:50	607	16.2	4.34	33	16.6	0.26
19:00	541	16.7	4.35	33	16.7	0.27
19:10	617	16.1	4.32	39	16.3	0.29
19:20	599	16.1	4.23	49	16.0	0.34
19:30	643	15.8	4.31	38	16.0	0.27
19:40	588	16.2	4.27	37	16.2	0.26
19:50	627	16.0	4.31	48	16.4	0.36
20:00	588	16.2	4.24	75	16.3	0.55
20:10	564	16.5	4.32	62	16.4	0.47
20:20	623	16.0	4.30	76	16.2	0.55
20:30	625	16.0	4.33	37	16.1	0.27
20:40	640	15.9	4.38	34	16.2	0.25
20:50	610	16.1	4.35	35	16.2	0.25
21:00	583	16.3	4.32	38	16.5	0.29
21:10	597	16.2	4.30	41	16.0	0.29
21:20	618	15.9	4.16	48	16.0	0.33
21:30	604	16.1	4.24	34	16.4	0.26
21:40	611	16.1	4.33	38	16.2	0.27
21:50	618	16.2	4.43	36	16.3	0.27
22:00	616	16.1	4.32	45	16.2	0.32
22:10	630	15.9	4.26	49	16.0	0.34
22:20	627	16.0	4.32	52	16.2	0.37
22:30	616	16.2	4.45	55	16.2	0.40

continued

10 Minute Averages Continued March 27, 1981

Start of 10 Minute Period	Scrubber Inlet			Scrubber Outlet		
	SO_2 ppm	O_2 %	E #/mmBtu	SO_2 ppm	O_2 %	E #/mmBtu
22:40	614	16.2	4.42	43	16.5	0.33
22:50	609	16.2	4.42	40	16.2	0.29
23:00	614	16.0	4.28	49	16.1	0.35
23:10	618	16.0	4.29	54	16.0	0.38
23:20	652	15.7	4.25	54	15.8	0.36
23:30	645	15.8	4.28	34	16.1	0.24
23:40	599	16.1	4.23	31	16.3	0.23
23:50	629	16.0	4.33	38	16.1	0.27

10 Minute Averages
March 28, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	624	16.0	4.29	47	16.1	0.33
00:10	622	16.1	4.36	47	16.2	0.34
00:40	603	16.3	4.46	39	16.4	0.29
00:50	615	16.3	4.52	31	16.4	0.23
01:00	604	16.3	4.44	35	16.3	0.26
01:10	628	16.2	4.49	35	16.2	0.25
01:20	604	16.4	4.58	31	16.7	0.25
01:30	595	16.5	4.57	32	16.6	0.25
01:40	597	16.5	4.63	30	16.7	0.24
01:50	569	16.7	4.64	31	16.6	0.24
02:00	580	16.6	4.54	35	16.6	0.28
02:10	586	16.6	4.59	33	16.6	0.26
02:20	580	16.6	4.62	35	16.7	0.28
02:30	584	16.6	4.60	31	16.8	0.25
02:40	604	16.4	4.52	31	16.5	0.24
02:50	620	16.3	4.55	32	16.5	0.25
03:00	602	16.4	4.51	36	16.4	0.27
03:10	626	16.1	4.42	41	16.3	0.30
03:20	613	16.3	4.49	38	16.5	0.29
03:30	603	16.4	4.54	33	16.3	0.25
03:40	607	16.3	4.47	30	16.5	0.23
03:50	635	16.1	4.47	36	16.3	0.26
04:00	598	16.4	4.55	38	16.4	0.29
04:10	622	16.2	4.49	46	16.3	0.33
04:20	679	15.8	4.49	53	15.8	0.36
04:30	710	15.7	4.67	47	16.0	0.33
04:40	679	16.0	4.66	44	16.1	0.31
04:50	698	15.9	4.70	46	16.0	0.32
05:00	672	16.0	4.64	52	16.0	0.36
05:10	683	15.9	4.64	55	16.1	0.39
05:20	667	16.1	4.69	54	16.1	0.38
05:30	654	16.2	4.70	48	16.3	0.35
05:40	636	16.1	4.50	47	16.2	0.34
05:50	609	16.2	4.43	55	16.0	0.38
06:00	614	16.1	4.36	59	16.2	0.42
06:10	602	16.2	4.37	60	16.2	0.44
06:20	614	16.2	4.40	60	16.3	0.44
06:30	626	16.1	4.39	62	16.4	0.47
06:40	622	16.1	4.35	75	16.1	0.52
06:50	668	15.6	4.28	62	15.9	0.42
07:00	640	15.8	4.25	66	16.1	0.47
07:10	623	15.9	4.26	66	16.2	0.47
07:20	586	16.2	4.21	61	16.5	0.47
07:30	599	16.2	4.36	55	16.5	0.43
07:40	567	16.5	4.35	52	16.7	0.42
07:50	540	16.7	4.39	53	16.7	0.42
08:00	545	16.6	4.33	55	16.7	0.44
08:10	623	15.8	4.18	78	15.9	0.53
08:20	594	16.1	4.18	71	16.0	0.49
08:30	654	15.6	4.19	70	15.8	0.47
08:40	681	15.3	4.16	79	15.6	0.51
08:50	670	15.4	4.14	81	15.7	0.53
09:00	623	15.6	4.03	87	15.8	0.58
09:10	644	15.5	4.03	99	15.5	0.61
09:20	633	15.6	4.01	95	15.9	0.64
09:30	651	15.6	4.15	64	15.8	0.43
09:50	720	15.5	4.55	63	15.4	0.39
10:00	753	15.2	4.51	54	15.6	0.34
10:10	767	15.1	4.51	61	15.2	0.37

continued

10 Minute Averages Continued March 28, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
10:20	750	15.2	4.46	55	15.2	0.33
10:30	743	15.2	4.39	47	15.3	0.28
10:40	713	15.4	4.40	48	15.6	0.31
10:50	659	15.8	4.38	40	15.6	0.26
11:00	694	15.5	4.32	42	15.4	0.26
11:10	705	15.2	4.21	46	15.3	0.28
11:20	710	15.3	4.28	41	15.2	0.25
11:30	687	15.2	4.08	41	15.2	0.25
11:40	694	15.1	4.05	36	15.5	0.22
11:50	623	15.7	4.09	32	15.8	0.22
12:00	588	16.0	4.07	29	16.1	0.21
12:10	615	16.3	4.50	28	16.4	0.21
12:20	569	16.5	4.40	27	16.1	0.19
12:30	672	15.4	4.16	24	20.0	0.90
12:40	627	15.7	4.10	27	15.6	0.18
12:50	602	15.9	4.08	27	15.9	0.18
13:40	618	16.1	4.40	36	16.7	0.29
13:50	588	16.3	4.34	53	16.3	0.40
14:00	632	16.0	4.41	68	16.4	0.51
14:10	622	16.0	4.34	84	16.3	0.62
14:20	628	16.0	4.31	80	16.2	0.58
14:30	625	16.0	4.32	84	16.2	0.60
14:40	629	15.9	4.29	84	16.1	0.60
14:50	602	16.0	4.15	101	16.0	0.69
15:00	606	15.9	4.15	109	16.3	0.81
15:10	586	16.0	4.04	118	16.1	0.84
15:20	596	16.0	4.12	96	16.3	0.70
15:30	583	16.3	4.26	103	16.4	0.78
15:40	569	16.3	4.18	101	16.2	0.72
15:50	529	16.6	4.13	107	16.5	0.83
16:00	528	16.6	4.18	109	16.8	0.89
16:10	496	16.9	4.24	103	16.9	0.89
16:20	514	17.0	4.44	80	17.0	0.70
16:30	522	17.0	4.49	67	16.9	0.57
16:40	523	16.9	4.48	61	17.0	0.53
16:50	489	17.3	4.54	66	17.1	0.59
17:00	500	17.2	4.55	63	17.1	0.56
17:10	482	17.3	4.50	58	17.2	0.53
17:20	490	17.3	4.64	51	17.3	0.47
17:30	484	17.4	4.70	47	17.3	0.44
17:40	471	17.5	4.76	41	17.3	0.39
17:50	480	17.4	4.62	28	18.8	0.44
18:00	289	19.2	5.91	28	18.9	0.47
18:10	292	19.2	5.99	25	18.9	0.42
18:20	278	19.4	6.37	16	18.9	0.28
18:30	323	19.1	5.93	24	18.3	0.32
18:40	471	17.7	5.03	39	17.0	0.35
18:50	584	16.4	4.43	57	16.6	0.45
19:00	537	16.8	4.43	56	16.8	0.46
19:10	539	16.7	4.33	48	16.8	0.40
19:20	526	16.9	4.49	40	17.0	0.35
19:30	572	16.7	4.67	42	16.9	0.35
19:40	546	17.1	4.83	40	17.2	0.36
19:50	553	16.9	4.71	46	17.0	0.39
20:00	564	16.9	4.73	41	16.7	0.33
20:10	580	16.8	4.76	41	16.7	0.33
20:20	619	16.6	4.83	38	16.7	0.31
20:30	643	16.4	4.82	42	16.5	0.32
20:40	638	16.4	4.84	46	16.4	0.35
20:50	675	16.1	4.80	49	16.5	0.38
21:00	621	16.6	4.93	50	16.6	0.39
21:10	643	16.5	4.97	47	16.5	0.36

continued

10 Minute Averages Continued March 28, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
21:20	632	16.7	5.12	36	16.8	0.30
21:30	624	16.8	5.22	42	16.7	0.34
21:40	604	17.0	5.20	44	16.9	0.38
21:50	606	16.8	4.99	72	16.7	0.58
22:00	683	16.2	4.97	79	17.4	0.77
22:10	438	18.3	5.76	59	17.9	0.66
22:20	470	18.1	5.72	55	18.0	0.63
22:30	467	18.3	6.00	59	17.5	0.59
22:40	543	17.5	5.43	72	17.6	0.74
22:50	509	17.7	5.46	85	17.4	0.83
23:00	532	17.4	5.21	102	17.4	1.00
23:10	538	17.4	5.21	100	17.4	0.96
23:20	571	17.2	5.26	88	17.5	0.88
23:30	546	17.5	5.48	87	17.7	0.92
23:40	527	17.7	5.52	80	17.5	0.81
23:50	511	17.7	5.45	94	17.7	1.01

10 Minute Averages
March 29, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	525	17.8	5.84	86	17.8	0.93
00:10	559	17.5	5.62	97	17.5	0.96
00:20	575	17.6	5.86	92	17.6	0.94
00:30	602	17.3	5.75	83	17.5	0.83
00:40	578	17.4	5.63	88	17.6	0.91
00:50	553	17.5	5.53	106	17.5	1.05
01:00	578	17.3	5.42	119	17.1	1.07
01:10	598	17.1	5.37	122	17.2	1.11
01:20	610	17.1	5.52	99	17.3	0.92
01:30	583	17.4	5.57	99	17.5	0.99
01:40	575	17.5	5.72	86	17.4	0.85
01:50	596	17.0	5.21	116	17.2	1.08
02:00	588	17.2	5.41	122	17.3	1.16
02:10	602	17.1	5.42	123	17.1	1.09
02:20	595	17.2	5.47	107	17.4	1.02
02:30	617	17.1	5.46	105	17.2	0.96
02:40	610	17.0	5.31	104	17.1	0.93
02:50	611	16.9	5.20	139	17.0	1.20
03:00	617	16.8	5.08	137	16.7	1.10
03:10	669	16.4	4.99	126	16.9	1.07
03:20	651	16.5	5.07	114	16.7	0.92
03:30	668	16.3	4.97	132	16.5	1.02
03:40	625	16.6	4.92	116	16.7	0.94
03:50	592	16.6	4.72	126	16.9	1.06
04:00	588	16.6	4.67	140	16.7	1.15
04:10	587	16.7	4.74	128	17.1	1.15
04:20	578	16.9	4.90	118	17.1	1.07
04:30	577	16.9	4.89	116	16.8	0.95
04:40	602	16.7	4.81	119	17.0	1.03
04:50	559	16.9	4.72	138	17.1	1.21
09:00	433	18.0	5.00	171	17.7	1.82
09:10	453	17.7	4.84	171	17.7	1.81
09:20	468	17.7	4.98	91	17.3	0.86
09:30	515	19.3	11.02	78	16.1	0.55
10:50	570	18.4	7.87	29	18.4	0.40
11:00	599	18.4	7.97	28	18.4	0.38
11:10	583	18.5	8.16	24	18.5	0.33
11:20	535	18.8	8.47	26	18.5	0.38
11:30	560	18.5	8.03	30	18.4	0.41
11:40	554	18.6	8.28	25	18.6	0.37
11:50	543	18.6	7.88	28	18.5	0.39
12:00	569	18.4	7.75	35	18.4	0.48
12:10	573	18.4	7.75	37	18.4	0.51
12:20	518	18.8	8.34	50	18.5	0.70
12:30	547	18.6	8.07	57	18.6	0.83
12:40	588	18.3	7.61	61	18.5	0.85
12:50	536	18.6	7.77	65	18.5	0.90
13:00	588	18.3	7.72	68	18.5	0.94
13:10	538	18.6	7.91	58	18.5	0.82
13:20	583	18.3	7.48	64	18.3	0.83
13:30	535	18.6	7.76	69	18.3	0.92
13:40	653	17.9	7.45	70	18.2	0.89
13:50	567	18.2	7.13	56	18.4	0.76
14:00	544	18.3	7.14	56	18.2	0.70
14:10	572	18.1	6.91	61	18.1	[illegible]74
14:20	600	17.8	6.64	28	17.7	0.30
14:30	632	17.6	6.42	26	17.4	0.26
14:40	600	17.8	6.59	20	17.8	0.22
14:50	569	17.9	6.50	18	17.8	0.20

continued

10 Minute Averages Continued March 29, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
15:00	609	17.7	6.41	16	17.6	0.17
15:10	603	17.7	6.38	16	17.6	0.16
15:20	613	17.7	6.50	16	17.6	0.17
15:30	614	17.7	6.51	18	17.7	0.19
15:40	626	17.6	6.43	21	17.6	0.21
15:50	617	17.6	6.35	15	17.6	0.15
16:00	606	17.6	6.32	19	17.6	0.20
16:10	607	17.6	6.32	19	17.6	0.20
16:20	567	17.9	6.47	19	17.8	0.20
16:30	586	17.8	6.42	17	17.7	0.18
16:40	586	17.8	6.39	16	17.8	0.18
16:50	588	17.9	6.54	12	18.5	0.17
17:00	615	17.7	6.50	16	17.6	0.16
17:10	628	17.7	6.56	16	17.7	0.16
17:20	603	17.9	6.76	17	17.7	0.18
17:30	611	17.8	6.68	15	17.7	0.16
17:40	603	17.8	6.68	14	17.9	0.16
17:50	591	18.1	7.05	18	17.9	0.21
18:00	617	17.8	6.86	23	17.8	0.25
18:10	578	18.1	7.07	32	18.1	0.39
18:20	570	18.2	7.25	57	18.1	0.69
18:30	601	18.1	7.19	75	18.1	0.92
18:40	603	18.0	7.17	79	17.7	0.83
18:50	611	17.7	6.41	81	17.6	0.83
19:00	603	17.8	6.53	59	17.7	0.64
19:10	604	17.8	6.51	46	17.6	0.47
19:20	624	17.7	6.65	35	17.5	0.35
19:30	627	17.8	6.79	31	17.6	0.31
19:40	615	17.9	6.91	27	17.7	0.28
19:50	627	17.8	6.80	23	17.8	0.26
20:00	630	17.8	6.87	25	17.6	0.26
20:10	664	17.6	6.76	25	17.5	0.25
20:20	638	17.7	6.77	24	17.6	0.24
20:30	616	17.9	6.87	24	17.7	0.25
20:40	611	17.9	6.95	23	17.7	0.25
20:50	574	18.0	6.74	16	17.9	0.18
21:00	581	18.1	6.94	19	17.9	0.21
21:10	554	18.2	7.04	16	18.0	0.19
21:20	555	18.3	7.27	16	18.1	0.19
21:30	573	18.2	7.32	16	18.1	0.19
21:40	573	18.3	7.40	16	18.2	0.20
21:50	566	18.3	7.26	15	18.1	0.18
22:00	522	18.5	7.36	11	18.4	0.15
22:10	500	18.7	7.56	10	18.7	0.15
22:20	473	18.9	8.05	12	18.6	0.17
22:30	502	18.7	7.76	13	18.5	0.18
22:40	499	18.8	8.06	12	18.6	0.18
22:50	451	19.1	8.54	8	19.0	0.14
23:00	403	19.5	10.09	9	18.8	0.15
23:10	575	18.3	7.42	14	18.4	0.18
23:20	556	18.6	8.13	16	19.3	0.34
23:30	587	18.4	7.86	21	21.3	****
23:40	625	18.1	7.48	17	18.2	0.22
23:50	553	18.6	8.06	14	18.7	0.21

10 Minute Averages
March 30, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	553	18.8	9.03	17	19.4	0.37
00:10	563	18.7	8.71	19	21.3	****
00:20	597	18.5	8.37	21	20.8	6.64
00:30	618	18.3	8.04	23	20.9	****
00:40	627	18.3	8.10	20	20.3	1.17
00:50	608	18.3	8.08	19	20.2	0.93
01:00	615	18.3	8.12	22	18.6	0.32
01:10	606	18.3	7.83	20	18.1	0.25
01:20	657	17.9	7.49	20	17.9	0.23
01:30	654	17.8	7.27	21	17.8	0.23
01:40	610	18.1	7.33	21	18.0	0.24
01:50	618	18.1	7.36	25	17.8	0.27
02:00	102	22.1	****	36	18.1	0.44
02:10	742	17.5	7.41	53	17.3	0.50
02:20	648	17.8	7.17	22	18.0	0.26
02:30	575	18.4	7.74	21	18.1	0.26
02:40	627	18.1	7.54	24	18.0	0.28
02:50	684	17.7	7.32	39	17.6	0.40
03:00	657	17.9	7.50	31	17.9	0.34
03:10	647	18.1	7.73	29	18.0	0.35
03:20	637	18.2	8.05	56	21.0	****
03:30	632	18.3	8.29	57	22.6	****
03:40	652	18.3	8.43	51	20.4	3.25
03:50	664	18.1	8.13	47	19.4	1.05
04:00	671	18.0	7.91	46	22.2	****
04:10	698	17.9	7.77	50	20.0	1.89
04:20	664	17.9	7.59	52	19.5	1.24
04:30	667	17.9	7.55	54	18.6	0.78
04:40	675	17.8	7.49	61	18.7	0.94
04:50	643	18.0	7.44	65	18.0	0.77
05:00	648	17.9	7.30	68	18.1	0.82
05:10	627	18.0	7.36	69	18.1	0.85
05:20	639	17.3	6.02	106	17.3	1.00
05:30	629	17.3	5.93	100	17.5	1.00
05:40	98	17.5	0.98	64	19.9	2.16
05:50	918	17.8	10.04	***	17.9	****
06:00	540	18.3	7.04	63	18.5	0.89
06:10	540	18.2	6.78	30	18.3	0.39
06:20	575	18.0	6.73	33	18.2	0.41
06:30	530	18.1	6.42	46	18.3	0.61
06:40	550	18.0	6.43	53	18.1	0.64
06:50	580	17.9	6.56	44	17.9	0.50
07:00	550	18.1	6.66	61	18.1	0.73
07:10	535	18.0	6.26	68	17.9	0.77
07:20	545	18.0	6.37	18	18.0	0.21
07:30	511	18.1	6.19	20	18.0	0.24
07:40	540	18.0	6.32	18	18.0	0.21
07:50	408	18.1	5.94	32	18.1	[illegible]
08:00	462	18.9	7.84	26	18.7	0.41
08:10	457	18.7	7.05	20	18.5	0.28
08:20	457	18.7	7.05	23	18.6	0.33
08:30	462	18.5	6.53	19	18.4	0.26
08:40	437	18.7	6.74	15	18.5	0.27
08:50	***	***	****	***	***	****
09:50	430	17.2	3.92	27	17.2	0.25
10:00	437	17.4	4.23	30	17.3	0.28
10:10	445	17.7	4.70	35	17.5	0.35
10:20	448	17.7	4.72	36	17.6	0.37
10:30	446	17.6	4.57	35	17.6	0.36

continued

10 Minute Averages Continued March 30, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
10:40	449	17.6	4.63	35	17.6	0.36
10:50	471	17.4	4.62	33	17.6	0.33
11:00	472	17.5	4.65	32	17.2	0.29
11:10	449	17.4	4.30	48	17.2	0.44
11:20	449	15.1	2.61	43	14.9	0.25
11:30	451	15.0	2.59	48	14.8	0.27
11:40	463	14.9	2.62	***	17.3	****
12:10	449	17.3	4.25	10	17.5	0.10
12:20	462	17.7	4.85	12	17.7	0.13
12:30	451	17.8	4.99	15	17.8	0.16
12:40	452	17.9	5.08	16	17.7	0.17
12:50	467	17.7	4.98	16	17.7	0.17
13:00	477	17.7	5.04	19	17.7	0.20
13:10	442	17.8	4.88	15	17.7	0.16
13:20	466	17.7	4.98	20	17.4	0.19
13:30	487	17.5	4.80	17	17.5	0.17
13:40	490	17.5	4.83	18	17.5	0.17
13:50	465	17.6	4.84	16	17.5	0.17
14:00	474	17.5	4.73	16	17.5	0.15
14:10	472	17.5	4.66	16	17.4	0.15
14:20	478	17.4	4.66	17	17.4	0.16
14:30	415	17.7	4.45	7	16.9	0.06
14:40	507	17.8	5.55	10	17.8	0.11
14:50	527	17.8	5.77	8	17.8	0.08
15:00	457	17.9	5.17	8	17.9	0.09
15:20	531	16.5	4.13	12	16.4	0.09
15:30	540	16.4	4.06	16	16.4	0.12
15:40	513	16.6	4.01	17	16.4	0.13
15:50	534	16.5	4.09	17	16.4	0.13
16:00	512	16.7	4.11	14	16.7	0.12
16:10	523	16.6	4.16	16	16.6	0.13
16:20	554	16.5	4.26	24	16.4	0.18
16:30	563	16.4	4.27	29	16.4	0.21
16:40	575	16.4	4.31	39	16.4	0.29
16:50	568	16.4	4.28	43	16.4	0.32
17:00	555	16.4	4.21	37	16.4	0.28
17:10	564	16.4	4.29	41	16.4	0.31
17:20	545	16.6	4.29	42	16.6	0.33
17:30	551	16.7	4.40	27	16.7	0.22
17:40	616	17.4	5.97	19	17.4	0.18
17:50	541	17.6	5.48	48	17.6	0.50
18:00	590	18.1	7.15	22	18.1	0.26
18:10	597	18.2	7.50	28	18.2	0.35
18:40	513	17.6	5.30	87	17.9	0.99
18:50	505	17.9	5.65	99	18.0	1.15

10 Minute Averages
April 2, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	296	19.0	5.19	8	18.7	0.13
00:10	296	19.0	5.26	6	18.7	0.09
00:20	309	18.9	5.18	11	18.0	0.13
00:30	576	16.8	4.71	11	17.6	0.12
00:40	525	17.1	4.64	23	17.0	0.20
00:50	519	17.2	4.74	25	16.9	0.21
01:00	548	17.0	4.82	21	16.9	0.18
01:10	532	17.1	4.76	22	17.0	0.19
01:20	541	17.0	4.75	24	16.9	0.20
01:30	546	17.0	4.76	25	16.9	0.21
01:40	551	17.0	4.78	28	16.9	0.24
01:50	534	17.1	4.78	28	16.9	0.24
02:00	537	17.1	4.79	30	16.9	0.26
02:10	530	17.2	4.90	27	17.0	0.24
02:20	541	17.1	4.87	28	17.0	0.24
02:30	549	17.1	4.91	27	17.1	0.24
02:40	539	17.2	4.88	30	17.0	0.26
02:50	543	17.2	4.93	29	17.0	0.25
03:00	565	17.1	4.98	31	17.0	0.27
03:10	574	17.1	5.10	30	16.9	0.26
03:20	588	17.0	5.16	31	16.9	0.27
03:30	567	17.1	5.05	30	17.0	0.26
03:40	556	17.1	4.99	23	17.5	0.23
03:50	436	18.0	5.13	22	17.8	0.24
04:00	439	18.0	5.16	21	17.8	0.23
04:10	433	18.1	5.20	19	18.0	0.22
04:20	426	18.2	5.33	22	17.9	0.25
04:30	428	18.2	5.29	14	18.1	0.17
04:40	415	18.4	5.54	19	18.2	0.24
04:50	398	18.5	5.63	17	18.2	0.21
05:00	392	18.5	5.63	16	18.3	0.21
05:10	387	18.6	5.70	14	18.4	0.19
05:20	382	18.6	5.70	15	18.4	0.21
05:30	380	18.7	5.78	14	18.5	0.20
05:40	445	18.2	5.56	23	17.8	0.25
05:50	471	17.9	5.28	21	17.8	0.23
06:00	452	18.0	5.33	20	17.9	0.23
06:10	488	17.8	5.37	23	17.7	0.25
06:20	468	17.9	5.33	21	17.8	0.23
06:30	435	18.1	5.27	17	18.0	0.20
06:40	452	18.1	5.39	21	17.8	0.24
06:50	457	17.9	5.19	20	17.7	0.20
07:00	484	17.8	5.24	21	17.7	0.22
07:10	495	17.7	5.18	21	17.5	0.21
07:20	505	17.6	5.17	23	17.3	0.21
07:30	519	17.5	5.11	22	17.2	0.21
07:40	535	17.4	5.11	23	17.2	0.21
07:50	535	17.4	5.12	23	17.2	0.21
08:00	534	17.3	5.03	23	17.1	0.21
08:10	545	17.2	4.97	24	17.0	0.21
08:20	550	17.2	4.98	23	17.0	0.20
08:30	539	17.1	4.81	21	17.1	0.19
08:40	521	17.2	4.81	22	17.2	0.20
09:20	521	16.2	3.78	12	16.8	0.10
09:30	521	16.9	4.39	13	17.0	0.11
09:40	439	17.6	4.52	12	17.4	0.12
09:50	434	17.8	4.69	14	17.5	0.14
10:00	466	17.5	4.64	15	17.5	0.15
10:10	452	17.7	4.72	16	17.5	0.15

continued

10 Minute Averages Continued April 2, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	O2 %	E #/mmBtu	Scrubber Outlet SO2 ppm	O2 %	E #/mmBtu
10:20	470	17.6	4.77	17	17.2	0.16
10:30	486	17.4	4.67	14	17.2	0.13
10:40	490	17.2	4.55	12	17.2	0.11
10:50	480	17.4	4.64	12	17.4	0.11
11:00	458	17.5	4.59	12	17.3	0.11
11:10	486	17.3	4.60	8	17.3	0.07
11:20	477	17.3	4.55	5	16.9	0.05
11:30	492	17.2	4.50	4	17.3	0.03
11:40	470	17.5	4.65	2	17.4	0.02
11:50	418	17.8	4.64	2	17.7	0.02
12:00	428	17.8	4.60	3	17.6	0.03
12:10	420	17.8	4.62	***	17.6	****
12:20	414	17.8	4.53	2	17.6	0.02
12:30	422	17.8	4.56	3	17.5	0.03
12:40	442	17.5	4.47	3	17.3	0.03
12:50	454	17.4	4.44	***	17.3	****
13:00	439	17.5	4.33	3	17.2	0.03
13:10	459	17.3	4.29	3	17.0	0.02
13:20	438	17.4	4.29	2	17.0	0.02
13:30	451	17.3	4.30	3	17.2	0.03
13:40	436	17.4	4.25	4	17.1	0.03
13:50	440	17.4	4.30	2	17.3	0.02
14:00	472	17.2	4.31	6	17.0	0.05
14:10	474	17.1	4.28	2	17.2	0.02
14:20	463	17.3	4.37	5	18.5	0.07
14:30	234	19.2	4.75	***	18.9	****
14:40	474	17.3	4.52	3	17.1	0.03
14:50	453	17.5	4.50	1	17.4	0.01
15:00	462	17.4	4.45	5	17.4	0.05
15:10	380	18.0	4.46	3	18.0	0.04
15:20	350	18.4	4.68	5	18.1	0.06
15:30	399	18.0	4.67	4	17.6	0.04
15:40	429	17.7	4.54	7	17.4	0.07
15:50	471	17.4	4.60	8	17.3	0.07
16:00	470	17.4	4.55	7	17.4	0.07
16:10	481	17.5	4.75	8	17.3	0.08
16:20	461	17.5	4.64	7	17.5	0.07
16:30	400	18.0	4.70	6	17.8	0.06
16:40	372	18.3	4.85	9	17.9	0.10
16:50	405	18.0	4.79	6	17.8	0.06
17:00	409	17.9	4.62	8	17.7	0.09
17:10	402	18.0	4.64	8	17.7	0.08
17:20	411	17.9	4.63	7	17.8	0.07
17:30	420	17.8	4.66	6	17.8	0.07
17:40	406	17.9	4.64	8	17.6	0.09
17:50	409	18.0	4.71	6	17.8	0.06
18:00	389	18.1	4.66	9	17.8	0.09
18:10	401	18.0	4.65	9	17.7	0.09
18:20	398	18.0	4.74	7	17.8	0.08
18:30	399	18.0	4.71	7	17.9	0.08
18:40	398	18.1	4.85	7	17.9	0.08
18:50	396	18.0	4.69	8	17.8	0.09
19:00	395	18.1	4.73	11	17.9	0.12
19:10	380	18.2	4.85	9	18.0	0.11
19:20	390	18.2	4.89	10	18.0	0.11
19:30	370	18.4	4.95	8	18.1	0.10
19:40	373	18.3	4.89	9	18.1	0.11
19:50	373	18.3	4.92	8	18.1	0.10
20:00	379	18.3	5.02	8	18.2	0.10
20:10	411	18.1	4.93	12	17.6	0.13
20:20	442	17.9	4.94	11	17.8	0.12
20:30	432	18.0	5.09	12	17.8	0.13

continued

10 Minute Averages Continued April 2, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
20:40	428	18.0	4.99	10	17.8	0.11
20:50	432	17.9	4.94	10	17.7	0.11
21:00	485	17.6	4.94	12	17.4	0.12
21:10	492	17.5	4.87	15	17.3	0.14
21:20	494	17.5	4.94	16	17.4	0.16
21:30	551	17.1	4.96	19	16.9	0.16
21:40	550	17.1	4.91	18	16.8	0.15
21:50	571	17.0	4.96	18	16.9	0.15
22:00	573	17.0	4.95	18	16.8	0.15
22:10	561	17.0	4.93	17	17.0	0.15
22:20	532	17.2	4.92	20	17.0	0.17
22:30	549	17.1	4.95	19	17.0	0.16
22:40	554	17.1	5.00	16	17.0	0.14
22:50	544	17.2	4.94	15	16.9	0.12
23:00	568	17.0	4.92	16	16.8	0.14
23:10	485	17.6	5.05	13	17.6	0.13
23:20	467	17.8	5.03	12	17.6	0.12
23:30	451	17.8	5.02	12	17.8	0.13
23:40	471	17.7	5.03	14	17.7	0.15
23:50	456	17.8	4.96	15	17.6	0.15

10 Minute Averages
April 3, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	436	18.1	5.20	14	18.0	0.17
00:10	399	18.3	5.24	16	18.0	0.18
00:20	422	18.1	5.11	16	18.0	0.19
00:30	431	18.1	5.20	15	18.0	0.18
00:40	409	18.2	5.10	16	17.9	0.19
00:50	418	18.1	5.09	15	17.9	0.17
01:00	431	18.0	4.99	18	17.8	0.19
01:10	419	18.0	4.94	12	17.8	0.13
01:20	435	17.9	4.92	14	17.6	0.14
01:30	445	17.8	4.94	14	17.7	0.15
01:40	451	17.8	4.99	11	17.8	0.12
01:50	441	17.8	4.89	12	17.6	0.13
02:00	449	17.8	4.90	9	17.7	0.10
02:10	429	17.9	4.88	11	17.8	0.12
02:20	417	18.1	4.98	10	17.9	0.11
02:30	430	17.9	4.93	8	17.7	0.09
02:40	437	17.9	4.93	8	17.8	0.09
02:50	434	17.9	4.89	9	17.8	0.10
03:00	440	17.8	4.84	10	17.6	0.10
03:10	446	17.8	4.82	11	17.7	0.11
03:20	453	17.8	4.94	9	17.6	0.10
03:30	460	17.7	4.85	9	17.6	0.10
03:40	453	17.7	4.75	11	17.4	0.11
03:50	517	17.3	4.81	14	17.2	0.13
04:00	522	17.3	4.92	13	17.3	0.12
04:10	512	17.4	4.92	15	17.3	0.14
04:20	492	17.4	4.78	12	17.4	0.12
04:30	471	17.6	4.89	10	17.7	0.10
04:40	444	17.9	4.96	10	17.7	0.10
04:50	432	17.9	4.82	8	17.8	0.09
05:00	396	18.2	4.97	10	18.1	0.12
05:10	428	17.9	4.91	11	17.9	0.13
05:20	425	18.0	5.01	13	17.8	0.14
05:30	444	17.9	5.06	11	17.9	0.13
05:40	444	17.9	5.08	12	17.8	0.14
05:50	435	18.0	5.09	12	17.8	0.13
06:00	465	17.7	5.00	16	17.6	0.16
06:10	481	17.7	5.15	16	17.6	0.16
06:20	477	17.7	5.03	16	17.6	0.17
06:30	459	17.8	5.01	19	17.6	0.20
06:40	470	17.7	4.96	19	17.6	0.19
06:50	462	17.7	4.92	18	17.6	0.19
07:00	485	17.5	4.87	18	17.6	0.18
07:10	490	17.6	5.02	20	17.6	0.21
07:20	488	17.7	5.15	23	17.7	0.25
07:30	453	17.8	4.98	19	17.7	0.20
07:40	439	18.0	5.06	19	17.8	0.21
07:50	432	18.0	4.98	10	17.7	0.10
08:20	300	17.4	2.92	9	17.8	0.10
08:30	278	18.6	4.12	3	18.4	0.04
08:40	278	18.8	4.49	5	18.4	0.06
08:50	294	18.8	4.66	8	18.4	0.11
09:00	452	17.5	4.56	9	17.4	0.09
09:10	572	16.7	4.57	15	16.7	0.12
09:20	510	16.9	4.37	21	16.8	0.17
09:30	527	17.0	4.55	32	16.9	0.27
09:40	508	17.1	4.54	36	17.1	0.32
09:50	481	17.3	4.57	28	17.4	0.28
10:00	491	17.3	4.58	35	16.9	0.30

continued

10 Minute Averages Continued April 3, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
10:10	481	17.3	4.51	30	17.0	0.26
10:20	475	17.3	4.46	24	17.1	0.22
10:30	451	17.5	4.48	25	17.1	0.23
10:40	458	17.4	4.45	21	17.2	0.20
10:50	441	17.5	4.43	20	17.3	0.19
11:00	436	17.6	4.52	20	17.6	0.21
11:10	306	18.6	4.49	10	18.4	0.14
11:20	582	16.8	4.85	13	17.1	0.12
11:30	494	17.1	4.40	19	16.9	0.16
12:10	435	17.8	4.78	23	17.6	0.24
12:20	515	17.9	5.77	17	16.9	0.15
12:30	519	17.2	4.76	17	17.4	0.17
13:30	532	16.3	3.95	27	16.8	0.23
13:40	583	17.0	5.04	39	16.9	0.33
13:50	614	17.0	5.39	39	17.0	0.34
14:00	486	17.8	5.34	24	17.8	0.26
14:10	457	18.0	5.42	17	17.9	0.20
14:20	473	16.0	5.44	18	17.7	0.19
14:30	463	18.1	5.58	18	17.7	0.19
14:40	459	18.2	5.72	15	17.8	0.16
14:50	474	18.1	5.73	13	18.0	0.16
15:30	515	17.6	5.28	9	17.7	0.09
15:40	479	18.2	5.97	4	17.9	0.05
15:50	487	18.0	5.78	5	17.8	0.06
16:00	474	18.1	5.83	4	18.0	0.05
16:10	469	18.3	6.07	3	18.1	0.03
16:20	471	18.3	6.12	***	18.3	0.01
16:30	413	18.6	6.04	7	18.1	0.09
16:40	429	18.6	6.25	11	17.9	0.13
16:50	496	18.0	5.83	14	18.0	0.16
17:10	461	17.7	4.85	11	18.1	0.13
17:20	440	18.3	5.76	9	18.3	0.12
17:30	431	18.4	5.95	9	18.1	0.11
17:40	457	18.3	5.96	9	18.2	0.11
17:50	448	18.4	6.01	9	18.2	0.12
18:00	455	18.3	5.89	10	18.2	0.13
18:10	447	18.4	6.18	8	18.5	0.11
18:20	440	18.5	6.22	6	18.6	0.09
18:30	401	18.8	6.54	4	18.6	0.05
18:40	465	18.3	6.04	5	18.0	0.06
18:50	611	17.2	5.53	13	17.3	0.12
19:00	542	17.8	5.91	16	17.9	0.18
19:10	470	18.2	5.92	6	18.2	0.08
19:20	451	18.4	6.10	6	18.0	0.07
19:30	481	18.2	6.00	5	18.2	0.07
19:40	485	18.1	5.85	7	17.9	0.07
19:50	506	18.0	5.86	10	18.0	0.12
20:00	510	18.0	5.87	7	18.0	0.08
20:10	471	18.2	5.86	6	18.1	0.07
20:20	438	18.4	5.90	6	18.1	0.08
20:30	409	18.5	5.72	3	18.2	0.04
20:40	402	18.5	5.63	3	18.1	0.04
20:50	439	18.1	5.29	8	17.6	0.08
21:00	508	17.3	4.85	11	17.5	0.11
21:10	477	17.5	4.82	9	17.6	0.09
21:20	494	17.5	4.97	5	17.8	0.06
21:30	469	17.8	5.11	5	17.7	0.06
21:40	461	17.9	5.13	7	17.9	0.07
21:50	450	17.8	4.88	5	17.8	0.06
22:00	443	17.8	4.91	8	17.7	0.09
22:10	488	17.5	4.93	9	17.7	0.09
22:20	478	17.6	4.97	10	17.7	0.11

continued

10 Minute Averages Continued April 3, 1981

Start of 10 Minute Period	Scrubber Inlet			Scrubber Outlet		
	SO2 ppm	O2 %	E #/mmBtu	SO2 ppm	O2 %	E #/mmBtu
22:30	480	17.6	4.86	8	17.7	0.09
22:40	457	17.8	5.05	7	17.8	0.08
22:50	426	18.0	5.04	3	18.0	0.03
23:00	439	17.9	5.03	2	18.9	0.03
23:10	277	18.7	4.25	***	18.4	****
23:20	257	18.8	4.18	***	18.6	****
23:30	259	18.8	4.15	***	18.5	****
23:40	278	18.8	4.60	***	18.5	****
23:50	290	18.7	4.57	***	18.2	****

10 Minute Averages
April 4, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	335	18.8	5.54	2	18.7	0.03
00:10	328	18.9	5.49	3	18.6	0.05
00:20	371	18.5	5.19	4	18.3	0.05
00:30	453	17.9	5.05	7	17.7	0.07
00:40	581	16.8	4.75	8	17.3	0.07
00:50	454	17.8	5.01	5	17.9	0.06
01:00	548	17.0	4.74	7	17.4	0.07
01:10	479	17.6	4.97	6	17.6	0.06
01:20	482	17.6	5.03	7	17.7	0.07
01:30	490	17.7	5.12	7	17.7	0.08
01:40	424	18.2	5.25	7	18.0	0.08
01:50	514	17.2	4.71	10	17.6	0.10
02:00	475	17.6	4.88	9	17.6	0.09
02:10	473	17.5	4.75	10	17.4	0.10
02:20	506	17.5	5.04	10	17.6	0.10
02:30	478	17.6	4.97	10	17.6	0.10
02:40	476	17.6	4.96	9	17.6	0.10
02:50	441	17.9	4.95	8	17.9	0.09
03:00	407	18.3	5.30	7	18.0	0.08
03:10	438	17.8	4.84	7	17.8	0.08
03:20	433	18.0	5.14	9	17.9	0.10
03:30	424	18.0	5.01	8	18.1	0.10
03:40	419	18.1	5.14	7	17.9	0.08
03:50	420	18.1	5.05	8	18.0	0.09
04:00	417	18.2	5.19	8	18.0	0.09
04:10	502	17.4	4.81	10	17.4	0.09
04:20	457	17.6	4.71	10	17.4	0.10
04:30	471	17.5	4.70	10	17.4	0.10
04:40	497	17.4	4.76	12	17.3	0.11
04:50	507	17.3	4.77	12	17.4	0.12
05:00	505	17.3	4.80	12	17.5	0.12
05:10	473	17.6	4.91	12	17.8	0.13
05:20	457	17.8	5.00	11	17.9	0.12
05:30	445	17.7	4.77	14	17.5	0.14
05:40	467	17.7	5.01	14	17.8	0.15
05:50	452	17.7	4.81	13	17.7	0.14
06:00	473	17.6	4.83	12	17.7	0.12
06:10	466	17.7	4.91	13	17.8	0.14
06:20	430	18.1	5.14	14	18.1	0.16
06:30	435	18.0	5.06	14	17.8	0.15
06:40	456	17.9	5.14	19	17.7	0.20
06:50	484	17.7	5.07	18	17.7	0.19
07:00	460	17.8	5.04	17	17.8	0.19
07:10	477	17.7	5.04	18	17.5	0.18
07:20	492	17.6	5.05	18	17.8	0.19
07:30	457	17.8	4.99	16	17.7	0.17
07:40	500	17.5	4.94	19	17.3	0.18
07:50	551	17.0	4.80	18	17.7	0.19
08:00	527	17.2	4.89	22	17.2	0.20
08:10	556	16.9	4.74	21	17.0	0.18
08:20	562	16.8	4.69	23	16.9	0.20
08:30	542	16.9	4.59	24	16.9	0.20
08:40	578	16.6	4.52	28	16.6	0.22
08:50	614	16.3	4.48	27	16.6	0.22
09:00	608	16.4	4.58	30	16.7	0.24
09:10	603	16.4	4.57	29	16.8	0.24
09:20	590	16.5	4.58	25	16.9	0.21
09:30	557	16.9	4.70	27	16.8	0.23
09:40	554	16.8	4.56	28	16.9	0.23

continued

10 Minute Averages Continued April 4, 1981

Start of 10 Minute Period	Scrubber Inlet			Scrubber Outlet		
	SO2 ppm	O2 %	E #/mmBtu	SO2 ppm	O2 %	E #/mmBtu
09:50	556	16.7	4.49	24	16.7	0.20
10:00	560	16.6	4.45	27	17.0	0.24
10:10	554	16.8	4.53	23	16.9	0.20
10:20	499	17.3	4.68	22	17.3	0.21
10:30	481	17.4	4.63	19	17.4	0.19
10:40	511	17.0	4.47	21	17.1	0.19
11:10	527	16.4	3.97	17	16.7	0.13
11:20	499	17.0	4.31	16	17.2	0.15
11:30	441	17.6	4.54	18	17.6	0.18
11:40	455	17.5	4.60	22	17.5	0.22
11:50	445	17.7	4.65	25	17.5	0.25
12:00	468	17.4	4.60	26	16.8	0.22
12:10	564	16.8	4.61	25	16.7	0.20
12:20	519	17.1	4.59	33	17.2	0.30
12:30	501	17.3	4.70	31	17.3	0.29
12:40	509	17.2	4.69	28	17.3	0.26
12:50	496	17.1	4.44	28	17.2	0.25
13:00	527	17.0	4.58	31	17.1	0.28
13:40	480	15.6	3.07	9	16.4	0.07
13:50	556	16.3	4.10	36	16.6	0.28
14:00	560	16.3	4.11	40	16.7	0.32
14:10	542	16.4	4.10	41	16.8	0.34
14:20	516	16.5	4.01	39	17.1	0.35
14:30	526	16.6	4.20	40	17.0	0.34
14:40	523	16.5	4.02	42	16.9	0.35
14:50	516	16.7	4.14	33	17.3	0.31
15:00	474	17.1	4.22	28	17.3	0.26
16:10	486	16.8	4.06	12	17.7	0.13
16:20	411	17.9	4.65	18	18.1	0.21
16:30	451	17.9	5.10	21	17.9	0.23
16:40	489	17.6	5.06	24	17.8	0.26
16:50	482	17.7	5.04	28	17.9	0.32
17:00	461	17.8	5.06	22	18.0	0.27
17:10	445	18.0	5.27	22	18.3	0.30
17:20	420	18.3	5.52	18	18.4	0.24
17:30	463	17.9	5.30	22	17.9	0.25
17:40	490	17.8	5.38	22	18.1	0.27
17:50	490	17.8	5.28	20	18.1	0.24
18:00	493	17.8	5.42	20	18.1	0.25
18:10	472	17.9	5.32	20	17.9	0.22
18:30	477	17.4	4.61	15	17.7	0.16
18:40	526	17.3	5.01	18	17.6	0.18
18:50	523	17.3	5.00	19	17.6	0.19
19:00	513	17.4	5.00	19	17.7	0.20
19:10	505	17.4	4.92	21	17.8	0.23
19:20	475	17.6	4.95	20	17.6	0.20
19:30	506	17.4	4.90	18	17.9	0.20
19:40	469	17.9	5.25	15	18.2	0.19
19:50	396	18.4	5.42	11	18.4	0.15
20:00	402	18.5	5.58	11	18.4	0.15
20:10	471	17.8	5.23	17	18.0	0.20
20:30	503	17.1	4.44	16	17.5	0.16
20:40	548	17.1	4.92	19	17.4	0.18
20:50	499	17.5	4.93	16	17.7	0.17
21:00	503	17.4	4.93	17	17.7	0.18
21:10	499	17.5	4.93	19	17.5	0.19
21:20	516	17.3	4.85	21	17.4	0.20
21:30	507	17.3	4.81	20	17.5	0.20
21:40	506	17.4	4.93	20	17.4	0.20
21:50	576	16.8	4.72	22	17.2	0.20
22:00	554	17.0	4.78	21	17.3	0.19
22:10	545	17.0	4.69	19	17.4	0.18

continued

10 Minute Averages Continued April 4, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
22:20	565	16.8	4.73	20	17.2	0.18
22:30	516	17.2	4.71	19	17.5	0.18
22:40	544	17.0	4.74	21	17.3	0.20
22:50	570	16.9	4.78	22	17.1	0.20
23:00	578	16.8	4.74	27	17.0	0.24
23:10	566	16.8	4.64	24	17.1	0.22
23:20	536	17.0	4.72	21	17.6	0.22
23:30	507	17.4	4.86	19	17.6	0.19
23:40	568	16.8	4.73	26	17.2	0.24
23:50	574	16.8	4.80	28	17.2	0.26

10 Minute Averages
April 5, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	544	17.1	4.87	19	17.5	0.19
00:10	554	17.0	4.77	19	17.4	0.18
00:20	531	17.2	4.91	16	17.5	0.16
00:30	569	16.8	4.71	25	17.0	0.22
00:40	597	16.6	4.74	26	17.0	0.23
00:50	582	16.6	4.65	29	17.0	0.26
01:00	594	16.6	4.74	34	17.0	0.29
01:10	590	16.6	4.67	32	17.2	0.29
01:20	510	17.2	4.64	25	17.4	0.24
01:30	516	17.1	4.63	19	17.5	0.18
01:40	513	17.2	4.73	21	17.5	0.21
01:50	499	17.3	4.77	18	17.8	0.19
02:00	466	17.7	4.91	15	17.9	0.17
02:10	481	17.5	4.80	14	17.7	0.14
02:20	499	17.3	4.72	16	17.5	0.16
02:30	481	17.5	4.74	16	17.7	0.16
02:40	461	17.7	4.90	16	17.8	0.18
02:50	456	17.8	5.02	13	17.9	0.15
03:00	452	17.9	5.13	13	17.8	0.14
03:10	441	18.0	5.07	10	18.1	0.12
03:20	432	18.1	5.26	10	18.1	0.13
03:30	488	17.6	5.04	12	17.6	0.12
03:40	495	17.5	5.01	15	17.5	0.15
03:50	500	17.5	5.03	15	17.7	0.15
04:00	482	17.7	5.13	15	17.6	0.16
04:10	507	17.5	5.02	18	17.7	0.19
04:20	496	17.6	5.13	18	17.6	0.19
04:30	471	17.8	5.10	16	18.0	0.19
04:40	575	17.0	5.05	26	17.3	0.25
04:50	566	17.2	5.16	23	17.4	0.23
05:00	564	17.1	5.01	27	17.3	0.26
05:10	580	16.9	4.97	31	17.4	0.30
05:20	541	17.2	4.93	30	17.4	0.28
05:30	535	17.2	4.95	33	17.3	0.31
05:40	573	17.0	5.04	34	17.4	0.33
05:50	549	17.1	4.96	31	17.6	0.32
06:00	512	17.5	5.08	30	17.7	0.32
06:10	516	17.4	5.03	31	17.6	0.32
06:20	538	17.2	4.97	34	17.4	0.33
06:30	544	17.2	4.93	36	17.4	0.34
06:40	551	17.2	4.98	34	17.5	0.33
06:50	523	17.4	5.09	29	17.7	0.31
07:00	524	17.3	4.98	34	17.6	0.35
07:10	531	17.2	4.88	31	17.5	0.31
07:20	542	17.2	4.92	33	17.5	0.32
07:30	512	17.3	4.77	30	17.5	0.30
07:40	517	17.4	4.96	31	17.5	0.31
07:50	535	17.2	4.88	32	17.4	0.31
08:00	546	17.2	4.96	33	17.4	0.32
08:10	560	17.0	4.83	35	17.3	0.33
08:20	543	17.1	4.87	36	17.4	0.35
08:30	496	17.5	4.88	29	17.8	0.31
08:40	487	17.6	4.97	28	17.7	0.30
08:50	498	17.6	5.05	30	17.5	0.29
09:00	506	17.5	4.98	34	17.5	0.34
09:10	505	17.4	4.92	34	17.6	0.35
09:20	486	17.6	4.98	33	17.7	0.35
09:30	498	17.5	4.97	28	17.7	0.30
09:40	511	17.4	4.91	31	17.5	0.30

continued

10 Minute Averages Continued April 5, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
09:50	556	17.2	5.03	43	17.4	0.42
10:00	541	17.2	4.91	46	17.4	0.44
10:10	527	17.2	4.84	42	17.4	0.40
10:20	524	17.2	4.82	44	17.4	0.42
10:30	516	17.3	4.91	37	17.5	0.36
10:40	530	17.2	4.91	41	17.8	0.45
11:00	529	17.0	4.55	36	17.5	0.36
11:10	509	17.6	5.23	32	17.8	0.35
11:20	516	17.6	5.28	35	17.7	0.37
11:30	503	17.7	5.36	34	17.8	0.37
11:40	514	17.5	5.20	35	17.7	0.37
11:50	522	17.6	5.34	36	17.7	0.38
12:00	527	17.5	5.19	34	17.6	0.36
12:10	513	17.6	5.26	33	17.7	0.36
12:20	503	17.7	5.36	32	18.0	0.36
12:30	552	17.4	5.29	39	17.4	0.38
12:40	536	17.3	5.07	38	17.5	0.38
12:50	532	17.4	5.16	35	17.7	0.38
13:00	575	17.2	5.22	34	17.3	0.32
14:40	731	15.0	4.23	39	16.1	0.28
14:50	730	16.1	5.17	46	16.4	0.35
15:00	741	16.2	5.33	54	16.5	0.41
15:10	766	16.2	5.51	55	16.8	0.45
15:20	721	16.5	5.50	59	16.5	0.46
15:30	692	16.7	5.53	42	17.2	0.39
15:40	700	16.8	5.73	46	17.1	0.41
15:50	712	16.8	5.87	43	17.0	0.37
16:00	673	16.8	5.60	32	17.3	0.30
16:10	667	17.1	5.92	37	17.7	0.39
16:20	638	17.4	6.25	44	17.5	0.44
16:50	616	16.9	5.27	39	17.2	0.35
17:00	637	17.0	5.60	39	17.3	0.37
17:10	548	17.7	5.78	27	17.7	0.29
17:20	577	17.6	5.94	30	17.7	0.31
17:30	549	17.8	5.98	28	17.8	0.31
17:40	571	17.7	5.99	31	17.7	0.33
17:50	571	17.7	6.11	32	17.7	0.35
18:00	572	17.6	5.94	31	17.6	0.32
18:10	576	17.6	5.94	26	17.7	0.27
18:20	584	17.5	5.89	28	17.6	0.28
18:30	587	17.4	5.66	31	17.5	0.31
18:40	590	17.4	5.76	30	17.6	0.31
18:50	564	17.6	5.75	29	17.6	0.30
19:00	576	17.6	5.84	29	17.6	0.30
19:10	553	17.7	5.86	26	17.8	0.29
19:20	550	17.8	5.98	27	17.7	0.29
19:30	572	17.6	5.92	27	17.8	0.30
19:40	574	17.7	6.03	31	17.7	0.33
19:50	483	18.4	6.44	28	17.8	0.30
20:00	555	17.8	5.98	28	17.7	0.29
20:10	571	17.5	5.78	31	17.5	0.31
20:20	590	17.4	5.72	37	17.4	0.36
20:30	630	17.1	5.68	43	17.3	0.40
20:40	663	16.9	5.59	45	17.2	0.42
20:50	640	17.1	5.67	49	17.3	0.46
21:00	665	17.0	5.72	55	17.2	0.51
21:10	647	17.1	5.84	56	17.4	0.54
21:20	664	17.1	5.88	66	17.3	0.62
21:30	671	17.0	5.81	63	17.4	0.62
21:40	623	17.1	5.63	70	17.3	0.66
21:50	644	17.1	5.78	64	17.5	0.64
22:00	611	17.3	5.82	59	17.4	0.57

continued

10 Minute Averages Continued April 5, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
22:10	647	17.1	5.80	54	17.5	0.53
22:20	602	17.2	5.58	47	17.5	0.47
22:30	627	17.0	5.43	56	17.2	0.51
22:40	624	17.0	5.46	51	17.3	0.48
22:50	597	17.1	5.38	45	17.4	0.43
23:00	592	17.3	5.53	44	17.4	0.42
23:10	609	17.1	5.49	43	17.3	0.41
23:20	607	17.2	5.51	40	17.3	0.37
23:30	594	17.1	5.34	38	17.2	0.35
23:40	605	17.1	5.37	33	17.3	0.31
23:50	591	17.1	5.31	33	17.2	0.30

10 Minute Averages
April 6, 1981

Start of 10 Minute Period	Scrubber Inlet			Scrubber Outlet		
	SO2 ppm	O2 %	E #/mmBtu	SO2 ppm	O2 %	E #/mmBtu
00:00	575	17.1	5.20	27	17.3	0.25
00:10	559	17.3	5.27	22	18.0	0.25
00:20	569	17.8	6.17	25	17.9	0.28
00:30	574	17.7	6.18	28	17.8	0.31
00:40	559	17.8	6.04	28	17.8	0.31
00:50	553	17.8	6.10	23	18.1	0.28
01:00	526	18.1	6.30	17	18.0	0.19
01:10	556	17.7	5.90	21	17.9	0.24
01:20	563	17.7	6.03	23	17.8	0.25
01:30	548	17.7	5.85	21	17.9	0.24
01:40	473	18.3	6.16	20	17.9	0.23
01:50	534	17.9	5.98	18	17.9	0.20
02:00	547	17.8	6.03	17	17.9	0.19
02:10	539	17.9	6.16	16	18.0	0.18
02:20	538	17.9	6.15	21	17.8	0.23
02:30	582	17.6	5.95	21	17.7	0.23
02:40	580	17.5	5.87	23	17.7	0.24
02:50	583	17.6	5.94	23	17.7	0.24
03:00	591	17.4	5.79	24	17.6	0.24
03:10	563	17.7	5.89	21	17.8	0.23
03:20	557	17.6	5.76	23	17.7	0.24
03:30	574	17.5	5.67	22	17.7	0.23
03:40	587	17.3	5.60	26	17.6	0.26
03:50	582	17.4	5.71	24	17.6	0.24
04:00	588	17.4	5.62	26	17.5	0.26
04:10	555	17.6	5.72	23	17.8	0.25
04:20	524	17.8	5.74	22	17.8	0.24
04:30	580	17.4	5.63	24	17.6	0.24
04:40	581	17.3	5.53	21	17.6	0.21
04:50	579	17.4	5.60	21	17.7	0.22
05:00	587	17.4	5.64	25	17.5	0.25
05:10	598	17.2	5.47	26	17.4	0.25
05:20	594	17.3	5.53	24	17.6	0.24
05:30	584	17.2	5.43	32	17.2	0.29
05:40	639	16.8	5.34	36	17.1	0.32
05:50	635	16.8	5.28	35	17.2	0.33
06:00	618	17.0	5.40	33	17.4	0.32
06:10	603	17.1	5.41	30	17.3	0.28
06:20	587	17.1	5.24	30	17.2	0.27
06:30	641	16.8	5.31	35	17.1	0.32
06:40	641	16.8	5.36	41	17.0	0.36
06:50	692	16.5	5.38	49	16.9	0.42
07:00	628	16.8	5.18	45	17.0	0.39
07:10	644	16.7	5.14	45	17.0	0.39
07:20	670	16.6	5.24	48	17.0	0.41
07:30	678	16.6	5.35	55	16.9	0.47
07:40	688	16.5	5.25	63	16.9	0.54
07:50	717	16.1	5.07	55	16.4	0.42
08:00	716	16.0	4.97	55	16.4	0.41
08:10	743	15.9	5.00	64	16.4	0.48
08:20	752	16.3	5.50	59	16.9	0.50
08:30	699	16.5	5.44	52	17.0	0.46
08:40	428	18.6	6.25	14	18.8	0.23
09:10	420	17.9	4.68	5	18.2	0.06
09:20	643	16.9	5.39	36	15.7	0.24
09:30	852	15.7	5.53	39	16.6	0.31
09:40	719	16.5	5.52	40	16.7	0.32
09:50	712	16.4	5.38	34	16.8	0.28
10:00	705	16.4	5.30	35	16.7	0.28

continued

10 Minute Averages Continued April 6, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
10:10	659	16.6	5.18	29	16.9	0.25
10:20	640	16.7	5.16	26	17.0	0.22
10:30	654	16.6	5.19	27	17.0	0.24
10:40	592	16.7	4.79	20	16.9	0.17
10:50	628	16.8	5.17	20	16.9	0.16
11:00	610	16.6	4.84	17	16.9	0.14
11:30	563	15.9	3.85	9	16.7	0.07
11:40	551	16.6	4.32	11	16.9	0.10
11:50	528	16.9	4.49	12	17.1	0.11
12:00	527	16.9	4.51	12	17.1	0.11
12:10	530	17.0	4.56	7	17.2	0.06
12:20	503	17.2	4.59	9	17.1	0.08
12:30	523	17.0	4.57	9	17.0	0.08
12:40	519	17.0	4.49	9	17.0	0.08
13:10	537	16.0	3.70	9	16.7	0.07
13:20	576	16.4	4.36	13	16.7	0.10
13:30	576	16.6	4.52	14	16.9	0.12
13:40	591	16.6	4.63	14	16.7	0.11
13:50	611	16.4	4.63	14	16.7	0.12
14:00	572	16.8	4.72	14	17.0	0.12
14:10	581	16.7	4.66	10	17.0	0.09
14:20	561	16.8	4.62	10	17.0	0.09
14:30	601	16.6	4.77	13	16.7	0.11
14:40	599	16.6	4.77	9	17.5	0.09
14:50	451	17.7	4.77	7	17.7	0.07
15:00	511	17.2	4.63	6	17.3	0.06
15:10	518	17.1	4.64	7	17.3	0.06
15:20	496	17.3	4.69	5	17.2	0.05
15:40	530	16.6	4.21	4	16.9	0.03
15:50	530	16.9	4.46	2	17.0	0.01
17:50	528	15.7	3.42	***	20.4	****
18:10	462	17.4	4.53	2	17.2	0.02
18:20	580	16.7	4.65	5	18.2	0.06
18:30	647	16.3	4.75	19	16.5	0.15
18:40	664	16.1	4.73	7	16.5	0.05
18:50	650	16.1	4.63	6	16.7	0.05
19:00	559	16.7	4.50	4	17.2	0.04
19:10	511	17.1	4.56	3	17.4	0.03
19:20	441	17.7	4.63	2	17.7	0.02
19:30	469	17.5	4.69	3	17.5	0.04
19:40	484	17.4	4.71	5	17.4	0.05
19:50	494	17.3	4.66	3	17.4	0.03
20:00	474	17.5	4.77	2	17.8	0.02
20:10	468	17.6	4.76	4	17.6	0.04
20:20	490	17.4	4.80	6	17.5	0.06
20:30	496	17.7	5.20	5	17.8	0.06
21:00	463	18.3	6.04	7	18.0	0.08
21:10	444	18.4	6.02	7	18.1	0.08
21:20	434	18.1	5.26	6	18.0	0.07
21:30	501	18.3	6.54	10	18.3	0.13
21:40	496	17.5	4.95	12	17.6	0.12
21:50	477	17.7	5.06	7	17.7	0.07
22:00	539	17.9	6.09	13	18.1	0.16
22:10	525	17.4	5.09	12	17.6	0.12
22:20	563	17.3	5.30	13	17.4	0.13
22:30	525	17.0	4.57	13	17.3	0.12
22:40	520	17.2	4.77	12	17.3	0.11
22:50	506	17.4	4.90	9	17.4	0.09
23:00	482	17.4	4.67	10	17.5	0.10
23:10	477	17.8	5.22	11	18.0	0.13
23:20	534	17.9	6.04	12	17.9	0.14
23:30	525	17.3	4.95	12	17.7	0.13

continued

10 Minute Averages Continued April 6, 1981

Start of 10 Minute Period	Scrubber Inlet			Scrubber Outlet		
	SO2 ppm	O2 %	E #/mmBtu	SO2 ppm	O2 %	E #/mmBtu
23:40	529	17.5	5.28	12	17.6	0.12
23:50	496	17.4	4.81	12	17.4	0.12

10 Minute Averages
April 7, 1981

Start of 10 Minute Period	Scrubber Inlet			Scrubber Outlet		
	SO2 ppm	O2 %	E #/mmBtu	SO2 ppm	O2 %	E #/mmBtu
00:00	472	17.6	4.85	11	17.7	0.12
00:10	458	17.6	4.71	16	17.8	0.18
00:20	463	18.0	5.42	9	17.9	0.10
00:30	458	18.3	5.97	9	18.1	0.11
00:40	529	18.5	7.48	10	18.4	0.14
00:50	529	18.1	6.41	9	18.3	0.12
01:00	515	17.9	5.82	10	18.4	0.14
01:10	496	18.3	6.47	10	18.4	0.14
01:20	482	17.9	5.45	11	18.4	0.15
01:30	472	18.1	5.72	8	18.1	0.10
01:40	477	18.3	6.22	13	18.1	0.16
01:50	487	18.0	5.70	13	18.4	0.18
02:00	472	18.1	5.72	9	18.3	0.12
02:10	477	18.0	5.58	9	18.1	0.11
02:20	525	18.1	6.36	10	18.3	0.13
02:30	525	18.3	6.85	11	18.3	0.14
02:40	506	18.0	5.92	10	18.4	0.14
02:50	472	17.8	5.16	8	17.9	0.09
03:00	515	17.9	5.82	10	18.0	0.12
03:10	539	18.0	6.30	10	18.1	0.12
03:20	510	18.1	6.18	10	18.3	0.13
03:30	515	17.9	5.82	10	17.8	0.11
03:40	491	18.0	5.74	13	18.0	0.15
03:50	467	18.0	5.46	12	18.1	0.15
04:00	477	17.9	5.39	13	18.1	0.16
04:10	510	18.4	6.92	12	18.3	0.16
04:20	515	18.4	6.99	13	18.5	0.18
04:30	529	18.6	7.80	12	18.5	0.17
04:40	539	18.5	7.62	11	18.4	0.15
04:50	520	18.1	6.30	10	17.8	0.11
05:00	477	17.9	5.39	11	17.9	0.12
05:10	534	17.9	6.04	11	17.8	0.12
05:20	534	18.0	6.25	12	18.1	0.15
05:30	529	17.9	5.98	12	18.0	0.14
05:40	548	17.7	5.81	16	17.8	0.18
05:50	577	17.8	6.31	15	17.6	0.15
06:00	549	17.6	5.64	16	17.6	0.16
06:10	611	17.5	6.10	17	17.5	0.17
06:20	606	17.6	6.23	16	17.6	0.16
06:30	611	17.7	6.48	21	17.7	0.22
06:40	716	17.5	7.14	24	17.5	0.24
06:50	591	17.4	5.73	19	17.4	0.18
07:00	668	17.1	5.96	25	17.3	0.24
07:10	711	17.4	6.89	27	17.1	0.24
07:20	720	17.1	6.43	24	17.4	0.23
07:30	601	17.0	5.23	19	17.1	0.17
07:40	653	16.4	4.92	17	16.8	0.14
07:50	577	17.3	5.44	16	16.8	0.13
08:30	578	18.5	8.24	15	18.7	0.23
08:40	575	18.5	8.22	18	18.6	0.27
08:50	594	18.7	9.12	48	19.6	1.25
10:10	535	17.2	4.90	12	17.6	0.13
10:20	500	17.8	5.48	9	18.0	0.11
10:30	496	17.8	5.42	9	17.8	0.10
10:40	504	17.7	5.31	11	17.7	0.12
11:10	503	16.8	4.20	10	17.2	0.09
11:20	540	17.2	4.91	12	17.3	0.12
11:30	562	17.3	5.29	12	17.4	0.11
11:40	527	17.4	5.18	10	17.7	0.11

continued

10 Minute Averages Continued April 7, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
11:50	505	17.5	4.98	9	17.5	0.09
12:00	515	17.3	4.84	11	17.4	0.11
12:10	518	17.3	4.95	12	17.3	0.12
12:20	546	17.2	5.01	11	17.4	0.11
12:30	511	17.4	4.89	10	17.6	0.10
12:40	518	17.3	4.87	10	17.4	0.10
12:50	514	17.3	4.89	10	17.3	0.10
13:00	522	17.2	4.83	9	17.2	0.08
13:10	542	17.0	4.74	8	17.2	0.07
13:20	547	17.0	4.82	4	17.2	0.04
13:30	526	17.1	4.70	6	17.3	0.06
14:20	503	16.3	3.68	1	17.1	****
14:30	484	17.0	4.25	6	17.3	0.05
14:40	494	17.1	4.37	5	17.3	0.05
14:50	486	17.1	4.37	8	17.3	0.08
15:00	476	17.3	4.49	10	17.4	0.10
15:10	496	17.2	4.56	11	17.3	0.10
15:20	488	17.3	4.59	9	17.3	0.09
15:30	470	17.4	4.52	10	17.4	0.09
15:40	491	17.3	4.58	10	17.4	0.09
16:10	492	17.0	4.31	7	17.4	0.07
16:20	471	17.4	4.62	10	17.7	0.11
16:30	435	17.8	4.72	10	17.6	0.10
16:40	468	17.6	4.78	11	17.7	0.12
16:50	468	17.5	4.73	6	17.7	0.07
17:00	473	17.5	4.78	7	17.8	0.08
17:10	439	18.0	5.06	6	18.0	0.08
17:20	419	18.0	4.89	7	18.0	0.08
17:30	458	17.8	4.97	6	17.9	0.07
17:40	446	17.9	5.06	6	17.9	0.07
17:50	452	17.8	5.00	6	17.9	0.07
18:00	453	17.8	4.89	7	17.8	0.08
18:10	428	18.2	5.47	7	18.1	0.09
18:20	425	18.3	5.57	14	18.2	0.17
18:30	470	17.9	5.39	14	18.0	0.16
18:40	474	18.0	5.47	13	18.2	0.17
18:50	447	18.2	5.66	13	18.3	0.18
19:00	451	18.1	5.38	11	17.9	0.13
19:10	440	18.1	5.28	12	18.0	0.14
19:20	451	18.0	5.31	10	18.1	0.12
19:30	428	18.2	5.44	12	18.0	0.15
19:40	476	17.9	5.33	18	18.0	0.21
19:50	440	18.1	5.42	24	18.2	0.30
20:00	457	18.1	5.48	32	18.4	0.43
20:10	455	18.1	5.56	44	18.2	0.56
20:20	458	18.2	5.67	59	18.2	0.74
20:30	472	18.1	5.63	48	18.2	0.61
20:40	450	18.1	5.51	40	18.1	0.49
20:50	473	18.0	5.44	32	18.0	0.37
21:00	449	18.2	5.55	22	18.2	0.28
21:10	436	18.3	5.62	17	18.2	0.21
21:20	480	17.7	5.16	19	17.9	0.21
21:30	476	17.8	5.13	19	17.8	0.21
21:40	465	17.9	5.21	16	17.8	0.18
21:50	486	17.7	5.20	11	17.9	0.13
22:00	466	17.9	5.18	11	18.0	0.13
22:10	471	17.8	5.17	11	17.9	0.12
22:20	461	17.9	5.23	12	18.1	0.14
22:30	453	18.0	5.35	9	18.0	0.11
22:40	457	18.1	5.51	11	18.2	0.14
22:50	464	18.0	5.33	13	18.2	0.17
23:00	464	18.0	5.47	25	18.3	0.33

continued

10 Minute Averages Continued April 7, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
23:10	423	18.4	5.66	32	18.4	0.43
23:20	435	18.2	5.49	52	18.3	0.66
23:30	418	18.4	5.62	51	18.6	0.74
23:40	418	18.4	5.78	54	18.5	0.77
23:50	425	18.4	5.76	57	18.5	0.81

10 Minute Averages
April 8, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	448	18.2	5.58	66	18.4	0.90
00:10	446	18.2	5.64	65	18.5	0.93
00:20	398	18.6	5.79	61	18.5	0.86
00:30	437	18.2	5.48	68	18.4	0.93
00:40	452	18.1	5.47	65	18.4	0.88
00:50	454	18.1	5.59	73	18.3	0.96
01:00	452	18.1	5.56	69	18.4	0.92
01:10	432	18.3	5.71	57	18.5	0.80
01:20	397	18.6	5.94	50	18.5	0.71
01:30	437	18.2	5.51	47	18.3	0.60
01:40	447	18.1	5.41	40	18.3	0.52
01:50	465	18.1	5.56	35	18.1	0.43
02:00	438	18.3	5.74	28	18.4	0.38
02:10	463	18.1	5.56	25	18.2	0.32
02:20	456	18.2	5.71	26	18.2	0.32
02:30	479	18.1	5.80	22	18.1	0.27
02:40	474	18.3	6.18	19	18.3	0.25
02:50	470	18.0	5.50	17	18.0	0.20
03:00	465	17.9	5.26	15	18.0	0.18
03:10	470	18.0	5.50	13	18.1	0.16
03:20	474	18.1	5.74	14	18.3	0.18
03:30	470	18.3	6.13	11	18.1	0.13
03:40	455	17.9	5.14	11	17.9	0.12
03:50	474	17.9	5.36	12	18.0	0.14
04:00	489	18.0	5.72	11	18.0	0.13
04:10	474	17.8	5.19	13	17.9	0.15
04:20	489	17.9	5.53	13	17.9	0.15
04:30	494	17.9	5.59	12	17.9	0.14
04:40	494	18.1	5.98	12	18.1	0.15
04:50	470	17.9	5.31	12	17.9	0.14
05:00	489	18.0	5.72	13	17.8	0.14
05:10	499	17.2	4.57	10	17.8	0.11
05:20	503	18.0	5.88	9	17.9	0.10
05:30	465	18.0	5.44	8	18.0	0.09
05:40	479	17.8	5.24	8	17.1	0.07
05:50	450	17.7	4.77	9	18.0	0.11
06:00	470	17.9	5.31	8	18.1	0.10
06:10	479	18.0	5.60	9	18.0	0.11
06:20	470	18.1	5.69	7	18.1	0.08
06:30	484	18.1	5.86	8	18.1	0.10
06:40	455	18.1	5.51	8	18.1	0.10
06:50	474	17.7	5.02	8	17.7	0.08
07:00	436	17.8	4.77	5	17.9	0.06
07:10	523	17.8	5.72	9	17.8	0.10
07:20	508	17.7	5.38	10	17.6	0.10
07:30	499	17.6	5.13	11	17.5	0.11
07:40	537	17.3	5.06	11	17.4	0.11
07:50	537	17.3	5.06	9	17.3	0.08
08:00	561	16.8	4.64	10	17.0	0.09
08:10	591	17.2	5.42	12	17.5	0.12
08:20	513	17.4	4.98	25	17.5	0.25
08:30	537	17.3	4.99	28	17.4	0.27
08:40	503	17.5	4.96	27	17.5	0.28
08:50	531	17.4	5.11	36	17.5	0.36
09:30	524	17.7	5.56	27	17.9	0.31
09:40	547	17.7	5.73	30	18.1	0.36
09:50	526	17.9	5.93	29	18.1	0.36
10:00	489	18.2	6.19	23	18.4	0.32
10:10	514	18.0	6.02	23	18.1	0.28

continued

10 Minute Averages Continued April 8, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
10:20	534	17.8	5.93	20	18.0	0.23
10:30	528	18.0	6.20	21	18.0	0.25
10:40	529	17.9	6.07	20	18.0	0.24
10:50	514	18.0	6.03	18	18.1	0.21
11:00	489	18.2	6.22	16	18.2	0.20
11:30	495	17.0	4.29	15	17.7	0.16
11:40	488	17.9	5.50	14	17.8	0.16
11:50	483	17.9	5.51	14	18.1	0.16
12:00	490	17.9	5.59	13	18.0	0.16
12:10	502	17.9	5.59	8	17.9	0.09
12:20	487	18.1	5.81	8	18.0	0.09
12:30	451	18.1	5.53	8	18.1	0.10
12:50	477	16.7	3.83	4	17.5	0.04
13:00	481	17.7	5.06	9	17.8	0.10
13:10	497	17.7	5.20	9	17.7	0.09
13:20	466	17.9	5.26	4	17.8	0.05
13:30	470	17.9	5.25	9	17.8	0.10
13:40	471	17.9	5.36	6	18.1	0.07
13:50	445	18.2	5.50	4	18.1	0.05
14:00	450	18.1	5.47	6	18.1	0.07
14:10	463	18.1	5.63	6	18.1	0.08
14:20	479	18.0	5.66	7	18.2	0.08
14:30	459	18.1	5.61	4	18.2	0.05
15:10	447	17.7	4.67	1	18.1	0.01
15:20	451	18.1	5.41	4	17.9	0.04
15:30	483	17.7	5.09	6	17.6	0.06
15:40	428	18.1	5.24	6	18.0	0.07
15:50	433	18.1	5.21	6	18.0	0.07
16:00	467	17.8	5.07	9	17.7	0.09
16:10	433	18.0	5.06	7	17.8	0.07
16:20	462	17.9	5.23	8	17.8	0.09
16:30	484	17.8	5.28	7	17.7	0.07
16:40	461	17.9	5.23	6	17.9	0.07
16:50	432	18.3	5.61	7	17.9	0.08
17:00	490	17.8	5.36	7	17.8	0.07
17:10	517	17.6	5.27	7	17.7	0.07
17:20	498	17.7	5.29	7	17.8	0.08
17:30	488	17.9	5.48	9	17.8	0.10
17:40	479	18.0	5.52	9	17.9	0.10
17:50	482	17.9	5.42	14	17.7	0.14
18:00	492	17.8	5.44	16	17.7	0.17
18:10	519	17.7	5.45	21	17.8	0.22
18:20	512	17.9	5.74	32	18.0	0.37
18:30	453	18.2	5.77	28	18.0	0.32
18:40	479	18.0	5.68	28	18.2	0.35
18:50	468	18.2	5.80	35	18.0	0.40
19:00	493	18.0	5.76	32	18.0	0.38
19:10	479	18.1	5.81	29	18.1	0.35
19:20	472	18.1	5.71	27	18.1	0.33
19:30	496	17.9	5.60	28	18.0	0.32
19:40	448	18.2	5.68	20	18.3	0.25
19:50	429	18.4	5.93	20	18.4	0.27
20:00	431	18.4	5.84	18	18.4	0.24
20:10	466	18.1	5.70	32	18.2	0.41
20:20	468	18.2	5.77	32	8.3	0.09
20:40	429	17.7	4.61	20	18.1	0.24
20:50	451	18.1	5.46	15	18.1	0.18
21:00	431	18.3	5.59	15	18.2	0.19
21:10	421	18.5	5.84	13	18.4	0.17
21:20	450	18.2	5.61	13	18.2	0.17
21:30	435	18.5	6.23	15	18.2	0.19
21:40	436	18.5	6.03	14	18.4	0.19

continued

10 Minute Averages Continued April 8, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
21:50	468	18.2	5.98	14	18.2	0.18
22:00	480	18.2	6.04	13	18.1	0.16
22:10	477	18.2	6.02	12	18.1	0.14
22:20	486	18.1	5.89	14	18.1	0.17
22:30	505	18.0	5.92	14	18.1	0.17
22:40	495	18.1	5.94	15	18.2	0.19
22:50	466	18.3	6.08	10	18.3	0.13
23:00	519	17.9	5.88	19	18.0	0.22
23:10	527	17.9	5.88	23	18.0	0.27
23:20	527	17.8	5.86	20	17.9	0.22
23:30	532	17.8	5.80	32	17.9	0.36
23:40	508	18.1	6.06	25	18.1	0.31
23:50	512	18.0	6.00	24	18.1	0.29

10 Minute Averages
April 9, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	O2 %	E #/mmBtu	Scrubber Outlet SO2 ppm	O2 %	E #/mmBtu
00:00	520	18.0	6.13	29	18.1	0.35
00:10	511	18.1	6.20	24	18.0	0.28
00:20	483	18.2	6.18	23	18.1	0.28
00:30	517	18.0	6.15	26	18.1	0.32
00:40	500	18.1	6.08	26	18.1	0.32
00:50	497	18.1	6.08	20	18.1	0.24
01:00	520	18.1	6.20	26	18.2	0.32
01:10	511	18.1	6.22	27	18.2	0.34
01:20	492	18.1	6.01	28	18.1	0.34
01:30	489	18.2	6.04	24	18.3	0.32
01:40	482	18.3	6.20	23	18.3	0.30
01:50	490	18.2	6.15	20	18.2	0.26
02:00	493	18.2	6.24	21	18.4	0.28
02:10	491	18.3	6.30	22	18.3	0.29
02:20	500	18.2	6.28	20	18.3	0.26
02:30	464	18.4	6.38	25	18.3	0.33
02:40	480	18.3	6.27	20	18.2	0.25
02:50	511	18.1	6.18	17	18.3	0.23
03:00	474	18.4	6.32	21	18.5	0.29
03:10	475	18.3	6.27	20	18.2	0.26
03:20	520	18.0	6.16	28	18.1	0.34
03:30	508	18.1	6.13	23	18.5	0.32
03:40	445	18.5	6.23	22	18.3	0.29
03:50	472	18.3	6.04	28	18.3	0.37
04:00	488	18.1	5.96	20	18.2	0.24
04:10	494	18.1	6.00	25	18.1	0.31
04:20	502	18.1	6.06	22	18.2	0.28
04:30	485	18.2	6.03	18	18.2	0.23
04:40	491	18.1	5.94	23	18.0	0.28
04:50	538	17.8	5.92	31	18.0	0.37
05:00	535	17.8	5.94	29	18.0	0.34
05:10	508	18.0	5.87	26	18.0	0.31
05:20	506	17.9	5.79	22	18.2	0.27
05:30	495	18.0	5.83	28	18.0	0.33
05:40	540	17.7	5.77	39	17.8	0.42
05:50	540	17.8	5.82	36	17.8	0.40
06:00	512	17.9	5.83	34	17.9	0.37
06:10	531	17.9	5.93	39	17.9	0.44
06:20	514	18.0	5.98	31	18.2	0.39
06:30	513	18.0	5.99	32	18.2	0.40
06:40	533	17.9	6.02	34	18.1	0.40
06:50	528	17.9	6.03	30	18.1	0.37
07:00	546	17.9	6.15	33	18.0	0.38
07:10	553	17.8	6.04	33	18.0	0.38
07:20	498	18.1	6.00	30	18.2	0.38
07:30	515	18.0	6.10	33	18.1	0.39
07:40	539	17.9	6.11	33	18.2	0.42
07:50	522	18.1	6.24	32	18.1	0.39
08:30	463	16.7	3.75	36	17.2	0.34
08:40	519	17.4	5.06	49	17.5	0.49
08:50	548	17.5	5.48	51	17.7	0.53
09:00	555	17.6	5.67	51	17.8	0.55
09:10	502	17.9	5.68	45	17.7	0.48
09:20	552	18.1	6.71	45	18.1	0.55
09:30	575	18.1	6.91	59	18.3	0.76
09:40	529	18.6	7.96	49	17.8	0.54
09:50	544	18.4	7.27	50	18.5	0.73
10:20	531	18.5	7.64	40	18.4	0.54
10:30	506	18.8	8.32	41	18.2	0.52

continued

10 Minute Averages Continued April 9, 1981

Start of 10 Minute Period	Scrubber Inlet			Scrubber Outlet		
	SO2 ppm	O2 %	E #/mmBtu	SO2 ppm	O2 %	E #/mmBtu
10:40	508	18.5	7.09	46	18.1	0.56
10:50	500	18.5	7.13	40	18.3	0.52
11:00	456	18.8	7.23	41	18.3	0.53
11:10	490	18.6	7.13	39	18.9	0.66
11:30	484	18.4	6.57	40	18.0	0.47
11:40	506	18.2	6.46	43	18.1	0.52
11:50	408	18.9	6.99	26	18.4	0.36
12:00	443	18.4	6.01	36	17.9	0.41
12:10	474	18.2	5.94	34	17.9	0.39
12:20	481	18.1	5.85	35	17.8	0.39
12:30	477	18.2	5.98	35	17.9	0.39
12:40	487	18.0	5.73	41	17.8	0.45
12:50	520	18.5	7.42	35	17.6	0.36
13:00	313	19.7	9.04	21	18.3	0.27
13:10	486	18.2	6.15	26	17.8	0.29
13:20	490	18.2	6.23	29	17.8	0.32
13:30	528	18.0	6.26	31	17.9	0.35
13:40	458	18.4	6.27	27	18.0	0.32
13:50	472	18.4	6.35	25	18.0	0.29
14:40	445	17.9	5.10	29	18.0	0.34
14:50	433	18.2	5.35	28	18.2	0.35
15:00	418	18.2	5.23	30	18.0	0.34
15:10	421	18.1	5.14	28	17.9	0.32
15:20	450	18.1	5.39	21	18.0	0.25
15:40	459	18.2	5.79	33	18.1	0.40
15:50	484	18.1	5.80	26	18.1	0.32
16:00	458	17.9	5.25	29	17.9	0.32
16:10	483	17.8	5.34	34	17.8	0.37
16:20	473	17.7	5.06	25	17.8	0.28
16:30	498	17.7	5.20	30	17.7	0.32
16:40	444	18.1	5.45	19	18.0	0.23
16:50	452	18.0	5.25	23	18.0	0.27
17:00	461	18.0	5.44	27	17.8	0.30
17:10	446	18.1	5.35	25	17.8	0.28
17:20	479	17.8	5.27	26	17.7	0.27
17:30	478	17.9	5.34	22	18.0	0.25
17:40	481	17.8	5.25	25	17.7	0.27
17:50	465	17.9	5.31	25	17.8	0.28
18:00	473	17.9	5.33	25	17.9	0.28
18:10	458	18.0	5.32	24	17.9	0.27
18:20	416	18.4	5.67	17	18.4	0.23
18:30	413	18.5	5.76	18	18.1	0.22
18:40	453	18.2	5.79	19	18.2	0.23
18:50	446	18.2	5.57	19	18.2	0.24
19:00	459	18.1	5.51	24	17.9	0.27
19:10	469	18.1	5.64	24	18.1	0.29
19:20	421	18.4	5.73	21	18.0	0.25
19:30	460	18.3	6.00	22	18.1	0.27
19:40	444	18.4	6.12	20	18.2	0.26
19:50	427	18.7	6.52	18	18.3	0.23
20:00	458	18.4	6.25	20	18.1	0.24
20:10	449	18.4	6.20	19	18.2	0.24
20:20	408	18.8	6.70	17	18.4	0.23
20:30	451	18.5	6.28	18	18.3	0.24
20:40	433	18.7	6.63	17	18.4	0.23
20:50	455	18.7	7.05	32	18.7	0.51
21:00	450	18.9	7.66	55	18.8	0.88
21:10	425	18.8	6.91	19	18.6	0.28
21:20	451	18.5	6.32	18	18.2	0.22
21:30	466	18.4	6.23	19	18.3	0.25
21:40	451	18.6	6.55	19	18.3	0.24
21:50	440	18.7	6.66	20	18.4	0.27

continued

10 Minute Averages Continued April 9, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
22:00	442	18.7	6.68	20	18.4	0.27
22:10	421	18.8	6.93	23	18.5	0.33
22:20	478	18.3	6.31	20	17.9	0.23
22:30	523	18.0	6.22	26	17.8	0.28
22:40	579	17.7	6.14	33	17.6	0.34
22:50	517	18.2	6.52	28	18.7	0.43
23:00	361	19.6	9.53	20	19.1	0.39
23:10	346	19.6	9.27	21	19.0	0.37
23:20	398	19.2	8.15	23	18.8	0.37
23:30	414	19.2	8.04	22	18.6	0.32
23:50	442	18.8	7.20	27	18.5	0.39

10 Minute Averages
April 10, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
00:00	398	19.2	8.03	13	19.4	0.29
00:10	302	20.2	15.32	31	20.2	1.50
00:20	383	20.1	15.32	5	19.4	0.12
00:30	369	18.9	6.26	3	18.7	0.05
00:40	395	18.7	6.23	9	18.8	0.15
00:50	401	18.6	5.98	7	18.4	0.09
01:00	380	18.7	5.97	2	18.6	0.02
01:10	397	18.7	6.12	9	18.6	0.13
01:20	414	18.5	5.76	6	13.5	0.09
01:30	366	19.0	6.47	5	18.9	0.08
01:40	340	19.3	7.02	5	19.0	0.09
01:50	387	18.8	6.23	6	18.9	0.10
02:00	354	19.2	6.95	6	18.9	0.11
02:10	337	19.4	7.48	6	19.0	0.11
02:20	334	19.3	6.90	10	18.0	0.11
02:30	434	18.4	5.95	6	18.4	0.08
02:40	414	18.6	6.16	6	18.7	0.08
02:50	425	18.6	6.16	5	18.5	0.08
03:00	379	18.9	6.28	4	18.8	0.07
03:10	443	18.2	5.65	9	18.3	0.12
03:20	473	18.0	5.49	9	18.1	0.11
03:30	455	18.2	5.61	10	18.2	0.13
03:40	436	18.3	5.61	7	18.1	0.09
03:50	439	18.3	5.76	11	18.3	0.14
04:00	417	18.5	5.89	8	18.3	0.10
04:10	441	18.3	5.76	9	18.3	0.12
04:20	435	18.3	5.60	7	18.2	0.09
04:30	448	18.1	5.51	9	18.2	0.12
04:40	445	18.2	5.54	9	18.2	0.11
04:50	459	18.2	5.66	8	18.3	0.11
05:00	446	18.2	5.58	7	18.0	0.09
05:10	450	18.1	5.49	4	18.1	0.05
05:20	473	18.0	5.45	9	18.0	0.11
05:30	480	17.8	5.30	12	18.0	0.14
05:40	465	18.0	5.44	11	18.1	0.13
05:50	462	18.0	5.36	8	18.1	0.10
06:00	432	18.2	5.39	15	18.0	0.18
06:10	457	18.0	5.37	12	18.0	0.14
06:20	490	17.8	5.29	14	17.9	0.15
06:30	488	17.7	5.16	18	17.7	0.19
06:40	500	17.6	5.16	19	17.7	0.20
06:50	474	17.9	5.31	20	18.0	0.23
07:00	503	17.6	5.20	17	17.7	0.18
07:10	523	17.5	5.20	27	17.6	0.27
07:20	501	17.6	5.14	24	17.8	0.26
07:30	469	17.8	5.14	22	18.1	0.26
07:40	428	18.1	5.22	20	18.1	0.24
07:50	456	18.0	5.37	22	18.0	0.25
08:00	464	17.9	5.24	20	18.0	0.24
08:10	441	18.1	5.35	25	18.1	0.31
08:20	467	17.9	5.35	25	18.1	0.30
08:30	459	18.0	5.42	20	18.3	0.26
08:40	407	18.5	5.71	17	18.3	0.22
08:50	460	18.0	5.33	18	18.0	0.21
09:00	480	17.8	5.23	20	17.9	0.22
09:10	468	17.9	5.24	22	17.9	0.25
09:20	487	17.7	5.17	21	17.7	0.23
09:30	481	17.8	5.26	15	17.9	0.17
09:40	469	17.8	5.20	19	18.0	0.22

continued

10 Minute Averages Continued April 10, 1981

Start of 10 Minute Period	Scrubber Inlet SO2 ppm	Scrubber Inlet O2 %	Scrubber Inlet E #/mmBtu	Scrubber Outlet SO2 ppm	Scrubber Outlet O2 %	Scrubber Outlet E #/mmBtu
09:50	308	19.2	6.14	9	19.1	0.16
10:00	500	17.6	5.12	19	17.5	0.19
10:10	473	17.7	4.94	15	17.8	0.16
10:20	481	17.6	4.95	17	17.7	0.18
10:30	516	17.3	4.90	17	17.5	0.17
10:40	483	17.6	4.92	19	17.6	0.19
10:50	478	17.7	5.04	20	17.8	0.22
11:00	457	18.0	5.29	19	17.8	0.21
11:10	481	17.7	5.09	17	17.4	0.17
11:20	572	17.0	4.98	26	17.2	0.24
11:30	497	17.6	5.03	18	17.8	0.20
11:40	487	17.6	5.06	18	17.7	0.18
11:50	523	17.3	4.97	18	17.4	0.17
12:00	539	17.3	5.02	18	17.5	0.18
12:10	499	17.5	5.00	22	17.7	0.23
12:20	497	17.6	5.08	19	17.7	0.20
12:30	491	17.6	4.99	18	17.7	0.19
12:40	431	18.0	5.08	14	18.3	0.18
12:50	404	18.3	5.31	15	18.2	0.20
13:00	399	18.3	5.27	12	18.4	0.16
13:10	395	18.4	5.26	10	18.2	0.12
13:20	439	18.0	5.08	11	17.9	0.13
13:30	459	17.8	5.10	10	17.9	0.12
14:00	471	16.4	3.53	16	17.2	0.14
14:10	496	17.2	4.54	16	17.6	0.17
14:20	462	17.5	4.67	21	17.7	0.22
14:30	479	17.5	4.81	17	17.6	0.18
14:40	477	17.5	4.78	15	17.8	0.17
15:40	471	17.0	4.05	40	17.2	0.36
16:10	449	17.4	4.34	33	17.5	0.34
16:20	414	17.7	4.38	37	17.7	0.39
16:30	408	17.7	4.33	39	17.6	0.41
16:40	422	17.5	4.23	33	17.6	0.34
16:50	447	17.5	4.44	18	17.5	0.18
17:00	468	17.4	4.51	24	17.4	0.23
17:10	490	17.4	4.74	27	17.6	0.28
17:20	435	17.6	4.41	19	17.6	0.20
17:30	440	17.6	4.51	21	17.6	0.22
17:40	429	17.7	4.49	27	17.7	0.28
17:50	429	17.6	4.47	29	17.7	0.30
18:00	450	17.5	4.53	27	17.5	0.27
18:10	432	17.6	4.40	14	17.6	0.14
18:20	446	17.5	4.50	15	17.6	0.15
18:30	433	17.7	4.53	13	17.7	0.13
18:40	492	17.1	4.43	15	17.4	0.15
18:50	446	17.5	4.39	10	17.5	0.10
19:00	450	17.4	4.34	12	17.4	0.12
19:10	424	17.6	4.36	10	17.7	0.11
19:20	436	17.4	4.28	9	17.7	0.10
19:30	421	17.6	4.35	11	17.5	0.11
19:40	464	17.3	4.38	16	17.3	0.15
19:50	482	17.2	4.40	12	17.4	0.11
20:00	470	17.3	4.42	12	17.3	0.11
20:10	479	17.3	4.47	10	17.6	0.10
20:20	427	17.6	4.34	9	17.5	0.09
20:30	458	17.4	4.38	11	17.4	0.11
20:40	469	17.3	4.43	13	17.5	0.12
20:50	466	17.4	4.46	7	17.4	0.06
21:00	463	17.4	4.46	11	17.4	0.10
21:10	492	17.1	4.44	7	17.3	0.07
21:20	437	17.6	4.43	8	17.4	0.08
21:30	448	17.5	4.44	12	17.4	0.12

continued

10 Minute Averages Continued April 10, 1981

Start of 10 Minute Period	Scrubber Inlet			Scrubber Outlet		
	SO2 ppm	O2 %	E #/mmBtu	SO2 ppm	O2 %	E #/mmBtu
21:40	468	17.4	4.50	11	17.3	0.10
21:50	499	17.2	4.54	10	17.4	0.10
22:00	475	17.4	4.61	11	17.4	0.10
22:10	480	17.4	4.60	11	17.4	0.11
22:20	421	17.8	4.60	11	17.7	0.12
22:30	434	17.6	4.52	11	17.5	0.11
22:40	459	17.5	4.61	14	17.5	0.14
22:50	461	17.5	4.61	10	17.5	0.10
23:00	466	17.5	4.59	8	17.4	0.08
23:10	485	17.4	4.71	9	17.8	0.10
23:20	438	17.7	4.67	5	17.7	0.06
23:30	441	17.7	4.68	11	17.6	0.11

APPENDIX B

AUDIT REPORTS, MANUAL QUALITY ASSURANCE TESTING & GAS CYLINDER CERTIFICATION

This appendix contains results of the continuous monitor audit and calibration checks. Reference is also made to independent audits conducted on March 5 and 6, 1981, by Research Triangle Institute (RTI) under contract to EPA.

Tables B-1 through B-7 present results of the audit tests conducted by PEDCo during the test program. In these tests, certified calibration gases are injected into the sampling probe and the monitor response is noted. In all cases the regression analysis slope was close to 1.0, indicating linear calibration. The correlation coefficient (r) was also very close to 1.0 in all cases.

Tables B-8 and B-9 summarize SO_2 concentrations measured in the flue gas by EPA Method 6 and the SO_2 monitor readings. The inlet data compared very well. A greater percentage variation was noted at the outlet; this was due in part to the lower concentrations at that site.

At the outset of this project, six traceable EPA calibration gas cylinders were used to establish the initial calibration curve of the SO_2 analyzer. The values of the four commercial SO_2 calibration gases were determined according to Protocol No. 1, by using the EPA cylinders in place of the Standard Reference Material (SRM). The following is a description of the procedure.

Procedure for Analysis of Cylinder Gas for True Concentration

(a) Analyze each cylinder gas directly against the nearest SRM by alternate analyses of the SRM and calibration gas in triplicate (3 pairs). If necessary, adjust the instrument span prior to the analysis, but do not adjust the instrument during the triplicate analyses. The response to zero gas shall be obtained with sufficient frequency so that the change in successive zero responses does not exceed 1 percent of full scale.

(b) For each of the six analyses, determine the apparent concentration of the SRM or cylinder gas from the calibration curve.

(c) For each pair of analyses, one SRM and one cylinder gas, calculate the true concentration of the cylinder gas by:

$$\text{True Conc. of Cyl. Gas} = \text{Apparent Conc. of Cyl. Gas} \times \frac{\text{True Conc. of SRM}}{\text{Apparent Conc. of SRM}}$$

(d) Determine the mean of the three values for true concentration of the cylinder gas.

Table B-10 presents the gas calibration results.

The oxygen calibration cylinders were analyzed in triplicate by using an ORSAT apparatus. Tables B-11 and B-12 present the results of these checks.

TABLE B-1. AUDIT RESULT AT SCRUBBER INTLET, MARCH 12

Cylinder No.	Audit gas concentration	Thermox WDG-P reponse, % O_2	Difference, %
121837	18.3% O_2/N_2	18.3	0.0
549049	8.8% O_2/N_2	9.0	2.27
Ambient air	20.9% O_2	20.7	-0.96
		DuPont 460-A response, SO_2 ppm	
X52892	100% N_2	-5	
EPA Cyl. No. AAL6071	433 ppm SO_2/N_2	420	-3.00
EPA Cyl. No. FF6440	2423 ppm SO_2/N_2	2281	-5.86
EPA Cyl. No. FF6706	4563 ppm SO_2/N_2	4488	-1.64

O_2 monitor regression analysis: Audit concentration $y = mx + b$
Slope = 0.941 Intercept = 0.952 $r = 0.9998$

SO_2 monitor regression analysis: Audit concentration $y = mx + b$
Slope = 0.926 Intercept = 8.99 $r = 0.9999$

TABLE B-2. AUDIT RESULT AT SCRUBBER OUTLET, MARCH 12

Cylinder No.	Audit gas concentration	Thermox WDG-P reponse, % O_2	Difference, %
X52892	100% N_2	1.1	
549049	8.8% O_2/N_2	9.0	3.41
121837	18.3% O_2/N_2	18.1	-1.09
Ambient air	20.9% O_2	20.9	-0.48
		DuPont 460-A response, SO_2 ppm	
EPA Cyl. No. FF5359	256 ppm SO_2/N_2	246	-3.91
EPA Cyl. No. LL1011	105 ppm SO_2/N_2	106.7	1.62
PEDCo Cyl. No. LL10225	44.5 ppm SO_2/N_2	51.0	14.6
EPA Cyl. No. LL 10403	50.7 ppm SO_2/N_2	55.0	8.48
EPA Cyl. No. AAL6071	433 ppm SO_2/N_2	410	-5.31

O_2 monitor regression analysis: Audit concentration $y = mx + b$
Slope = 0.941 Intercept = 0.952 $r = 0.9998$

SO_2 monitor regression analysis: Audit concentration $y = mx + b$
Slope = 0.926 Intercept = 8.99 $r = 0.9999$

TABLE B-3. AUDIT RESULTS AT SCRUBBER INLET, MARCH 26

Cylinder number	Audit conc., SO_2 ppm	DuPont 460-A response, SO_2 ppm	Difference, %
X52829	0 (100% N_2)	10	
EPA Cyl. No. FF6706	4563 ppm	4468	-2.1
EPA Cyl. No. FF6440	2423 ppm	2348	-3.1

SO_2 monitor regression analysis: Audit concentration $y = mx + b$
Slope = 0.978 Intercept = 0.868 $r = 1.0000$

TABLE B-4. AUDIT RESULTS AT SCRUBBER OUTLET, MARCH 26 WITHOUT LEAK[a]

Cylinder number	Audit conc., SO_2 ppm	DuPont 460-A response, SO_2 ppm	Difference, %
X52829	Zero (100% N_2)	0.0	
PEDCo Cyl. No. LL10225	44.5	45	1.1
EPA Cyl. No. FF5359	256	252.4	0.99

SO_2 monitor regression analysis: Audit concentration $y = mx + b$
Slope = 0.984 Intercept = 0.543 $r = 1.0000$

[a] Inlet line disconnected and leaking valve capped off.

TABLE B-5. AUDIT RESULTS AT SCRUBBER OUTLET, MARCH 26 WITH LEAK[a,b]

Cylinder number	Audit conc., SO_2 ppm	DuPont 460-A response, SO_2 ppm	Difference, %
	Zero (100% N_2)	24.0	
	256	173	6.64
	44.5	78	75.3

SO_2 monitor regression analysis: Audit concentration y = mx + b
Slope = 0.957 Intercept = 29.17 r = 0.9990

[a] Normal operating configuration including crossover leak from faulty sample select valve.

[b] Average inlet concentration during audit 621 ppm.

TABLE B-6. AUDIT RESULTS AT SCRUBBER INLET, APRIL 6, 1981

Cylinder number	Audit concentration, SO_2 ppm	DuPont 460-A response, SO_2 ppm	Difference, %
Ambient air	0	7.4	
AAL-6071	433	440	1.6
FF-6440	2423	2430	0.3

SO_2 monitor regression analysis: Audit concentration y = mx + b
Slope = 1.000 Intercept = 7.2 r = 1.0000

TABLE B-7. AUDIT RESULTS AT SCRUBBER OUTLET, APRIL 6

Cylinder number	Audit concentration, SO_2 ppm	DuPont 460-A response, SO_2 ppm	Difference, %
Ambient air	0	0.5	
LL10225	44.5	45.6	2.3
LL10403	50.7	53.2	4.9
FF5359	256	255.3	-0.3
AAL6071	433	434	0.2

SO_2 monitor regression analysis: Audit concentration $y = mx + b$
Slope = 0.998 Intercept = 1.18 $r = 0.9999$

TABLE B-8. METHOD 6 RESULTS AT SCRUBBER INLET, MARCH 20

Run No.	M-6 concentration, SO_2 ppm	DuPont 460-A concentration, SO_2 ppm	Difference, %
QAI-1	818	876	-7.1
QAI-2	855	838	2.0
QAI-3	965	952	1.4
QAI-4	864	860	0.5

TABLE B-9. METHOD 6 RESULTS AT SCRUBBER OUTLET, MARCH 21

Run No.	M-6 conc., SO_2 ppm	DuPont 460-A response, SO_2 ppm	Corrected[a] response, SO_2 ppm	Difference,[b] %
QAO-1	42.5	61.8	26.9	36.7
QAO-2	43.4	70.8	37.1	14.5
QAO-3	49.4	70.8	34.4	30.4
QAO-4	42	76	38.3	8.81
QAO-5[c]	112	140	118	-5.56

[a] Corrected response = (outlet response) - 0.0426 (inlet response).

[b] Corrected response vs. manual method.

[c] QAO-5 was run March 30th.

TABLE B-10. CALIBRATION GAS CERTIFICATION DATA

Date	Certified gas cylinder		Commercial gas cylinder		Avg.
	Value	Response % chart	Response % chart	Apparent value	
3/26	2423	51	72.5	3445	
	2423	50.5	73.25	3514	
	2423	50	72.0	3496	3485
3/26	2423	51	35.5	1687	
	2423	50.5	35.0	1679	
	2423	50	34.0	1648	1671
3/23	433	91	90.5	431	
	433	90.5	89.5	428	
	433	90	88.5	426	428
2/23	256	54	52	246.5	
	256	56	55	251.5	
	256	55	53	247	248

DRY MOLECULAR WEIGHT DETERMINATION

PLANT For Rickenbacker heating plant

DATE 25 FEB. 81 TEST NO

SAMPLING TIME (24-hr CLOCK) 1

SAMPLING LOCATION PEDCO SLAMS LAB

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) BAG

ANALYTICAL METHOD ORSAT

AMBIENT TEMPERATURE 25°C

OPERATOR Jim Rahtz, Andy Holstein

ORSAT LEAK CHECKED ATH

COMMENTS: Certification of O_2 Cyl #72831

RUN / GAS	1		2		3		AVERAGE NET VOLUME
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET	
CO_2	0.2%	0.2	0.2	0.2	~~0.0~~ 0.2	0.2	0.2
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	16.8%	16.6	16.7	16.5	16.8	16.6	16.6
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	17.0%	0.2	17.0	.3	16.8	0.0	0.2 ~~2.0~~
N_2 (NET IS 100 MINUS ACTUAL CO READING)	83.0		83.0		83.2		83.0

TABLE B-11. OXYGEN CALIBRATION GAS CHECK FOR RICKENBACKER HEATING PLANT

DRY MOLECULAR WEIGHT DETERMINATION

PLANT PedCo Mobile Lab - RICKENBACKER

COMMENTS:

DATE 3/4/81 TEST NO

SAMPLING TIME (24-hr CLOCK)

SAMPLING LOCATION O2 cylinder N33898

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) BAG

ANALYTICAL METHOD ORSAT

AMBIENT TEMPERATURE 14.5°C

OPERATOR PAC

.ORSAT LEAK CHECKED yes

GAS \ RUN	1		2		3		AVERAGE NET VOLUME
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET	
CO_2	0.4%	0.4	0.2	0.2	0.4	0.4	0.4
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	12.6%	12.2	12.2	12.0	12.4	12.0	12.0
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)							
N_2 (NET IS 100 MINUS ACTUAL CO READING)							

TABLE B-12. OXYGEN CALIBRATION GAS CHECK FOR PEDCO MOBILE LAB

APPENDIX C

SCRUBBER AND MONITORING SYSTEM AVAILABILITY INFORMATION

The CEM system installed at Rickenbacker ANG Base collected 30 days of data. These data indicated an SO_2 removal efficiency of at least 90 percent between March 3 and April 10, 1981. The significant events that affected scrubber and monitor availability are described here and listed in Table C-1.

The DuPont 460-A SO_2 analyzer and the Thermox WDG-P O_2 analyzer were operational on February 13, 1981.

The Apple II microcomputer and its ancillary equipment were installed one week later and began producing hard copy output on February 24. An additional week of adjustments and repeated calibrations to debug the computer program and monitors followed. The system reached its final configuration on March 3, 1981. This CEM system passed a relative accuracy test conducted March 3 through March 5, as well as an independent audit by the Research Triangle Institute on March 6, 1981.

A PEDCo audit team performed an internal audit on March 12, and the results were satisfactory. The 7-day operational test period, which began on March 11, was interrupted on March 13 because of the failure of a pump between the DuPont 460 SO_2 monitor and the Thermox O_2 monitor. This caused the loss of one day of data. The system was repaired by eliminating this pump on March 17.

Between March 16 and March 19 the scrubber was deliberately operated at low efficiency while the possibility of scaling was being investigated.

On March 20 and 21 a series of manual method quality assurance (QA) tests were conducted. These included inlet and outlet Method 6 tests, as well as inlet stratification tests.

The operational test period, which was restarted on March 18, was again interrupted on March 23 by a plantwide power failure. The operational test period was resumed on March 24 after allowing the CEM system one day to stabilize. The results of the outlet QA tests, which were released on March 25, indicated a significant systematic error in the outlet readings. All certification testing was halted while this problem was investigated.

In the evening of March 25, the CEM operator isolated a leaking sample select valve. The net effect of this leak was that a small amount of inlet flue gas was contaminating the outlet gas sample. A replacement valve was ordered and a series of incremental response checks, gas audits, and manual Method 6 tests were performed to quantify the leak. Each test showed a consistent leak rate of 4 to 5 percent and an average rate of 4.26 percent. On the basis of the QA tests, this leak was traced back to March 20, and corrections were made to all data from that day forward. The leak probably also affected data collected between March 16 and March 19, but these data were not used because of low scrubber efficiency. The scrubber was shut down on March 30 and remained down until April 1 because of a plugged slurry thickener outlet. The CEM system began collecting data again shortly before midnight on April 1. The leaking valve was replaced on April 3. The operational test period begun on the afternoon of April 3 was completed on April

10 without incident. A second series of Relative Accuracy tests were conducted April 7 through April 9. The CEM system stopped collecting data at midnight April 10, the test termination time.

TABLE C-1. SCRUBBER AND CEMS AVAILABILITY

Date (1981)	Hours scrubber available	Hours CEMS available	Hours CEM reported >90% SO_2 removal efficiency	Reasons for data loss[a]
3/4	24	24	16	
3/5	24	18	17	Short circuit; inlet heat trace, replacement of strip chart recorder.
3/6	24	21	21	Offline during RTI audit.
3/7	24	23	19	
3/8	24	19	14	Plugged probe.
3/9	24	20	20	Reprogramming of Apple II computer.
3/10	24	20	20	
3/11	24	19	19	Restarting of Apple II computer, offline for response time tests.
3/12	24	18	18	Offline for PEDCo audit.
3/13	24	12	0	Maintenance on O_2 analyzer exceeded 6 hours.
3/14	24	18	17	Valve failure on pump.
3/15	24	22	21	
3/16	24	23	11	Scrubber operating at low efficiency.
3/17	24	20	0	Investigation of possibility of scaling; data not used.
3/18	24	20	0	
3/19	24	20	6	
3/20	24	21	18	Offline periodically for stratification testing and QA tests.
3/21	24	19	19	
3/22	24	23	20	
3/23	22	20	4	Plant power failure; loss of more than 6 hours data.
3/24	24	22	11	
3/25	24	18	16	Offline to determine valve leak rate.
3/26	24	21	21	
3/27	24	21	21	
3/28	24	23	13	
3/29	24	19	12	
3/30	24	18	13	Offline to determine scrubber shutdown.
3/31	0	18	0	Scrubber down.
4/1	2	18	0	
4/2	24	24	24	

(continued)

TABLE C-1 (continued)

Date (1981)	Hours scrubber available	Hours CEMS available	Hours CEM reported $\geq 90\%$ SO_2 removal efficiency	Reasons for data loss[a]
4/3	24	21	21	Replacement of leaking valve.
4/4	24	22	22	
4/5	24	22	21	
4/6	24	22	22	
4/7	24	22	21	
4/8	24	23	21	
4/9	24	22	22	
4/10	24	23	23	
Total	864	779		

[a] Up to 2 hours of data loss is considered routine as a result of normal calibration and maintenance procedures.

APPENDIX D

SLURRY AND COAL ANALYSIS DATA

DAILY ANALYTICAL SUMMARY SHEET

SITE: Richenbacher DATE: 2-11-81 *

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed				
2	Second Stage Level Tank In				
3	Mill Pump Outlet				
4	Thickener Inlet				
5	Thickener Overflow		Not Required		
6	Thickener Underflow			Not Required	Not Required

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
2	Second Stage Level Tank In					

SOLIDS

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	yes
7	Limestone	no
8	Coal	no

* some samples were taken to check out selected analyses and to check sampling locations. No liquid data was recorded

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacher DATE: 2-12-81 *

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed				
2	Second Stage Level Tank In				
3	Mill Pump Outlet				
4	Thickener Inlet				
5	Thickener Overflow		Not Required		
6	Thickener Underflow			Not Required	Not Required

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
2	Second Stage Level Tank In					

SOLIDS

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	yes
7	Limestone	no
8	Coal	Yes

* Some samples were taken to check out selected analyses and to check sampling locations. No liquid analysis data was recorded.

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacker DATE: 2-13-81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	5.01	*	15	107
2	Second Stage Level Tank In	3.84	1.00	0	0
3	Mill Pump Outlet	5.77	1.05	23	0
4	Thickener Inlet	3.23	1.07	0	121
5	Thickener Overflow	4.02	Not Required	0	87
6	Thickener Underflow	4.65	1.07	Not Required	Not Required

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
2	Second Stage Level Tank In	945	1940	220	4410	6,000

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	
7	Limestone	
8	Coal	

* DATA MISRECORDED

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacker DATE: 2/14/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.14	1.09	0	121
2	Second Stage Level Tank In	3.05	1.11	0	217
3	Mill Pump Outlet	5.61	1.07	20	146
4	Thickener Inlet	5.41	1.08	13	146
5	Thickener Overflow	3.91	Not Required	0	107
6	Thickener Underflow	5.48	1.05	Not Required	Not Required

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
2	Second Stage Level Tank In	1050	2090	183	2750	7500

SOLIDS

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	no
7	Limestone	no
8	Coal	yes
	BOTTOM ASH	YES

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacker DATE: 2/16/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed				
2	Second Stage Level Tank In	3.49	1.05	0	121
3	Mill Pump Outlet				
4	Thickener Inlet				
5	Thickener Overflow		Not Required		
6	Thickener Underflow			Not Required	Not Required

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
2	Second Stage Level Tank In	1240	1690	81	3180	17300

SOLIDS

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	no
7	Limestone	no
8	Coal	yes

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacker DATE: 2/17/81

Point No.	Location	pH	Density* g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	5.85	1.10	17	301
2	Second Stage Level Tank In	3.55 4.62	1.02	0 **	53 1708
3	Mill Pump Outlet	5.90	1.11	30	87
4	Thickener Inlet	5.68	1.08	10	446
5	Thickener Overflow	4.05	Not Required	0	0
6	Thickener Underflow	5.93	1.19	Not Required	Not Required

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
2	Second Stage Level Tank In	1320	1130	181	2720	5,700

SOLIDS

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	no
7	Limestone	no
8	Coal	Yes

* Density Procedure Revised

** not analyzed

DAILY ANALYTICAL SUMMARY SHEET

SITE: Pickenbacker

DATE: 2/18/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	5.35 5.33	1.15 1.10	505	1640
2	Second Stage Level Tank In	5.05 4.57	1.11 1.12	355 200	1420 1890
3	Mill Pump Outlet	5.42 4.86	1.12 1.13	560	1750
4	Thickener Inlet	4.90 4.30	1.09 1.10	348	1520
5	Thickener Overflow	5.11 5.12	Not Required	429	1920
6	Thickener Underflow	5.36	1.17 1.15	Not Required	Not Required

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
2	Second Stage Level Tank In	1420 1420	1340 1320	36 5	2950 2520	5,600

SOLIDS

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	yes
7	Limestone	NO
8	Coal	Yes

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER

DATE: 2-19-81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.76 4.84	1.09 1.14	300 +	1240 *
2	Second Stage Level Tank In	4.72 4.40	1.11 *	280 100	1550 1400
3	Mill Pump Outlet	4.66 5.07	1.08 1.11	240	1460 *
4	Thickener Inlet	3.97 4.46	1.08 1.08	0	1640
5	Thickener Overflow	4.82 4.59	Not Required	320	1600
6	Thickener Underflow	4.61	1.13	Not Required	Not Required

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
2	Second Stage Level Tank In	1530 1440	1210 1390	6 3	2420 2640	6,700 6,700

SOLIDS

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	no
7	Limestone	no
8	Coal	Yes
	BOTTOM ASH	Yes

* DATA NOT RECORDED

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacker DATE: 2-20-81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	5.02 *	1.13 *	327 *	* *
2	Second Stage** Level Tank In	4.90 4.66	1.12 1.12	320 *	1390 *
3	Mill Pump Outlet	5.00 *	1.12 *	340	* *
4	Thickener Inlet	4.56 *	1.10 *	180	*
5	Thickener Overflow	5.02 *	Not Required	370	*
6	Thickener Underflow	4.98	1.18	Not Required	Not Required

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
2	Second Stage Level Tank In	1740 *	1360 —	49 *	2280 *	* 7,800

SOLIDS

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	NO
7	Limestone	yes
8	Coal	yes

* DATA NOT RECORDED

** LIQUID PORTION RETURNED TO BASE LAB FOR CHECK OF TOTAL $SO_4^=$ ANALYSIS

DAILY ANALYTICAL SUMMARY SHEET

SITE: Richenbacher DATE: 2-21-81 *

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed				
2	Second Stage Level Tank In				1270
3	Mill Pump Outlet				
4	Thickener Inlet				
5	Thickener Overflow		Not Required		
6	Thickener Underflow			Not Required	Not Required

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
2	Second Stage Level Tank In					

SOLIDS

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	no
7	Limestone	no
8	Coal	no

* Saturdays only adipic acid control sample analyzed.

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacker DATE: 2-22-81*

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed				
2	Second Stage Level Tank In				940
3	Mill Pump Outlet				
4	Thickener Inlet				
5	Thickener Overflow		Not Required		
6	Thickener Underflow			Not Required	Not Required

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
2	Second Stage Level Tank In					

SOLIDS

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	No
7	Limestone	NO
8	Coal	NO

*Sunday only adipic acid Control sample analyzed.

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacker DATE: 2-23-81 *

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	5.04 **	1.10 **	280	1010 1030
2	Second Stage Level Tank In				
3	Mill Pump Outlet	4.94	1.10	253	1110
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	2000	1200	2	2350	7700
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

SOLIDS

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener ~~Inlet~~ Underflow	Yes
7	Limestone	no
8	Coal	Yes

* New sampling scheduled started, The control sheet change to Limestone slurry Feed.

** Data not recorded

DAILY ANALYTICAL SUMMARY SHEET

SITE: Richenbacker DATE: 2-24-81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.83 4.5	1.11 *	210	940 1090
2	Second Stage Level Tank In	4.46	1.11	95	1000
3	Mill Pump Outlet	4.78	1.11	200	800
4	Thickener Inlet	4.17	1.10	0	990
5	Thickener Overflow	4.50	*	100	*
6	Thickener Underflow	4.55	1.18	*	1030

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	2090	1050	2	2210	7,600
2	Second Stage Level Tank In	2110	1170	2	2010	7,400
3	Mill Pump Outlet	2030	1060	2	2240	7,000
4	Thickener Inlet	2150	1030	62	2320	7,100
5	Thickener Overflow	*	*	*	*	*
6	Thickener Underflow	2110	1040	*	2260	7,000
9	Make Up Water	* 96	* 63	Not Required	Not Required	* <100

SOLIDS

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	no
7	Limestone	no
8	Coal	yes

* DATA NOT RECORDED

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacker DATE: 2-25-81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.73 4.73	1.12 1.15	212	1020 1300
2	Second Stage Level Tank In	4.58	1.11	172	1220
3	Mill Pump Outlet				
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	1820	1500	2	2780	9,400
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

SOLIDS

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	yes
7	Limestone	no
8	Coal	yes

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacker DATE: 2-26-81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.83 4.84	1.11 1.19	378	1830 1810
2	Second Stage Level Tank In				
3	Mill Pump Outlet	5.04	1.09	435	1530
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	2180	1230	2	2550	8,600
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

SOLIDS

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	no
7	Limestone	no
8	Coal	yes

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacker DATE: 2-27-81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone * Slurry Feed	4.2 4.5	1.10 1.13	0	2540 2090 } 2315
2	Second Stage Level Tank In				
3	Mill Pump Outlet	4.60	1.11	346	2860
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	1960	1370	2	2680	9,400
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

SOLIDS

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	yes
7	Limestone	yes
8	Coal	yes

* FILTERED LIQUID RETURNED FOR AUDIT

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER DATE: 2/28/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed		1.12		1950
2	Second Stage Level Tank In				
3	Mill Pump Outlet				
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed					
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

SOLIDS

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	No
7	Limestone	No
8	Coal	No

T.J.W.

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER DATE: 3/1/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed				1700
2	Second Stage Level Tank In				
3	Mill Pump Outlet				
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed					
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

SOLIDS

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	No
7	Limestone	No
8	Coal	No

T.J.W.

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER DATE: 3/2/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	A.M. 4.7 P.M. 4.77	1.16 1.12	377	1660 2080
2	Second Stage Level Tank In				
3	Mill Pump Outlet	4.83	1.12	377	2200
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	*	*	/	*	*
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

SOLIDS ✓

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	YES
7	Limestone	No
8	Coal	Yes

* DATA NOT OBTAINED

T.J.R.

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER DATE: 3/3/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.74 5.00	1.10 1.10	248	1680 1970
2	Second Stage Level Tank In	4.88	1.13	430	1980
3	Mill Pump Outlet	4.91	1.10	424	1820
4	Thickener Inlet	4.70	1.11	355	2210
5	Thickener Overflow	4.72	1.00	313	1810
6	Thickener Underflow	4.92	1.28	428	1780

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	2300	881	1	2630	7600
2	Second Stage Level Tank In	2390	964	8	2790	7200
3	Mill Pump Outlet	2350	951	3	2190	7400
4	Thickener Inlet	2430	948	54	2790	5600
5	Thickener Overflow	2400	1010	*	2520	5700
6	Thickener Underflow	2340	957	17	3090	*
9	Make Up Water	*	*	Not Required	Not Required	*

see 3-4-81

Point No.	Location	Was Solid✓ Sample Taken (Yes, No)
4	Thickener Inlet	No
7	Limestone	No
8	Coal	Yes

* DATA NOT OBTAINED

T.J.W.

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacker AFB DATE: 3-4-81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.70 4.78	1.11 1.12	398	2170 ✓ 2440
2	Second Stage Level Tank In				
3	Mill Pump Outlet	4.82	1.10	450	2510
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	2460	854	7	2340	6600
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water	108	32	Not Required	Not Required	4600 (??)

SO_2 SO_4

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	Yes
7	Limestone	No
8	Coal	Yes

T.J.W.

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER DATE: 3/5/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.92 4.94	1.10 1.12	558	2610 3230
2	Second Stage Level Tank In				
3	Mill Pump Outlet	4.91	1.11	623	2700
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	2560	745	2	2350	7000
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	SOLIDS✓ Was Sample Taken (Yes, No)
4	Thickener Inlet	No
7	Limestone	No
8	Coal	Yes

T.J.W.

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER DATE: 3/6/81

Point No.	Location		pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	A.M P.M	4.69 4.72	1.12 1.13	425	2040 2140
2	Second Stage Level Tank In					
3	Mill Pump Outlet		4.43	1.12	*	2130
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					

Point No.	Location		Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	AM.	2520	732	3	2400	5000
2	Second Stage Level Tank In						
3	Mill Pump Outlet						
4	Thickener Inlet						
5	Thickener Overflow						
6	Thickener Underflow						
9	Make Up Water				Not Required	Not Required	

SOLIDS ✓

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	Yes
7	Limestone	Yes
8	Coal	Yes

* DATA NOT OBTAINED

T.J.W.

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER DATE: 3/7/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.94	1.14		2290 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet				
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed					
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	No
7	Limestone	No
8	Coal	No

T.J.W.

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER DATE: 3/8/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed				2150 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet				
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed					
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	No
7	Limestone	No
8	Coal	No

T.J.W.

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER DATE: 3/9/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	5.15 ✓ 4.90 ✓	1.12 ✓ 1.12 ✓	556 ✓	1710 ✓ 1830 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet	5.12 ✓	1.12 ✓	582 ✓	2080
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	2480 ✓	615 ✓	2	2220	6710
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Solid Samples

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	Yes
7	Limestone	NO
8	Coal	Yes
6	Thickener Underflow -	No
1	Limestone Slurry feed -	No

T.J.N.

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER DATE: 3/10/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.90 ✓ 5.05 ✓	1.12 ✓ 1.12 ✓	465 ✓	2120 T.J.N. ~~2200~~ 2210 T.J.N.
2	Second Stage Level Tank In	4.91 ✓	1.12 ✓	570 ✓	2290 ✓
3	Mill Pump Outlet	4.83 ✓	1.11 ✓	459 ✓	1970 ✓
4	Thickener Inlet	4.83 ✓	1.11 ✓	493 ✓	2280 ✓
5	Thickener Overflow	4.85 ✓	N/A	532 ✓	2360 ✓
6	Thickener Underflow	LINE	PLUGGED.		

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	2420 ✓	605 ✓	2 ✓	2630	6100
2	Second Stage Level Tank In	2460 ✓	635 ✓	3 ✓	3010	5700
3	Mill Pump Outlet	2440 ✓	569 ✓	9 ✓	2170	5600
4	Thickener Inlet	2450 ✓	611 ✓	40 ✓	2710	5400
5	Thickener Overflow	2520 ✓	635 ✓		2700	6500
6	Thickener Underflow	LINE	PLUGGED			
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	No
7	Limestone	No
8	Coal	Yes

1 Limestone Slurry Feed No

6 Thickener Underflow No

T.J.N.

DAILY ANALYTICAL SUMMARY SHEET

SITE: RickenbackerANGB DATE: 3/11/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.80 ✓ 4.87 ✓	1.11 ✓ 1.13 ✓	430 ✓	1960 1800
2	Second Stage Level Tank In				
3	Mill Pump Outlet	4.99 ✓	1.11 ✓	561 ✓	1920
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	2400 ✓	585 ✓	2	2340	5300
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water	120	17	Not Required	Not Required	<100

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	Yes
7	Limestone	No
8	Coal	Yes
1	Limestone Slurry feed	No
6	Thickener Undeflow	No

T.J.N.

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER DATE: 3/12/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.80 ✓ 5.02 ✓	1.10 ✓ 1.13 ✓	486 ✓	1860 ✓ 1850 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet	5.04 ✓	1.13 ✓	595 ✓	1930 ✓
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	2440 ✓	576 ✓	4	2570	5400
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	No
7	Limestone	No
8	Coal	Yes
1	Limestone Slurry feed	Yes
6	Thickener Underflow	No

T.J.W.

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacker ANGB DATE: 3-13-81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.93 ✓ 4.88 ✓	1.11 ✓ 1.15 ✓	529 ✓	1870 ✓ 1300 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet	4.82 ✓	1.12 ✓	408 ✓	2140 ✓
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow		1.17 ✓		

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	2413 ✓	565 ✓	4	2600	6100 ✓
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	Yes
7	Limestone	Yes
8	Coal	Yes
1	Limestone Slurryfeed	No
6	Thickener Underflow	Yes (while pumping to pond)

T.J.W.

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacker ANGB DATE: 3-14-81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.70 ✓	1.11 ✓		1820 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet				
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed					
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	No
7	Limestone	No
8	Coal	No
1	limestone Slurry feed	No
6	Thickener Underflow	No

T.J.W.

DAILY ANALYTICAL SUMMARY SHEET

SITE: Pickenbacker DATE: 3/15/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed		1.14 ✓		2050 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet				
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed					
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	No
7	Limestone	No
8	Coal	No
1	Limestone Slurry feed	No
6	Thickener Underflow	No

T.J.W.

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacker DATE: 3/16/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.83 ✓ 4.68 ✓	1.13 ✓ 1.11 ✓	407 ✓	1890 ✓ 1690 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet	4.69 ✓	1.12 ✓	388 ✓	2350 ✓
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	2080 ✓	631 ✓	4 ✓	2410 ✓	6500 ✓
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	Yes
7	Limestone	No
8	Coal	Yes
1	Limestone Slurry feed	No
6	Thickener Underflow	No

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER

DATE: 3/17/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.25 ✓ 4.12 ✓	1.11 ✓ 1.09 ✓	60 ✓	1900 ✓ 1990 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet	4.19 ✓	1.10 ✓	0 ✓	2000 ✓
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	970 ✓	2080 ✓	5 ✓	5320	6500 ✓
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	No
7	Limestone	No
8	Coal	Yes
1	limestone Slurry feed	No
6.	Thickener Underflow	No

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER DATE: 3/18/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.13 ✓ 4.54 ✓	1.10 ✓ 1.13 ✓	0 ✓	2290 ✓ 2490 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet	4.37 ✓	1.11 ✓	200 ✓	2690 ✓
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	714 ✓	3300 ✓	3 ✓	9450 ✓	5900 ✓
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	Yes
7	Limestone	No
8	Coal	No
1	Limestone Slurry feed	No
6	Thickener Underflow	No

DAILY ANALYTICAL SUMMARY SHEET

SITE: ______________________ DATE: 3/19/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.12 ✓ 4.40 ✓	1.10 ✓ 1.07* ✓	0 ✓	2660 ✓ 2460 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet	4.24 ✓	1.08* ✓	50 ✓	3000 ✓
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	786 ✓	3980 ✓	2 ✓	11,400 ✓	6200 ✓
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	No
7	Limestone	No
8	Coal	Yes
1	Limestone Slurry feed	Yes
6.	Thickener Overflow	No

*The density is low due to a plugged line

* DATA NOT OBTAINED

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacker

DATE: 3/20/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.86 ✓ 5.13 ✓	1.11 ✓ 1.12 ✓	707 ✓	2860 ✓ 3180 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet	4.82 ✓	1.11 ✓	645 ✓	3040 ✓
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	778 ✓	3480 ✓	*	8940 ✓	5,400 ✓
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	Yes
7	Limestone	
8	Coal	Yes
6	Thickener Underflow	
1	limestone Slurry feed	No

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER DATE: 3/21/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	5.25 ✓ 5.54 ✓	1.13 ✓		2430 ✓ ~~2950~~ 2930 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet				
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed					
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	No
7	Limestone	No
8	Coal	No
1	limestone Slurry feed	No
6	Thickener Underflow	No

* DATA NOT OBTAINED

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacker DATE: 3/22/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	5.38 ✓	1.11 ✓	934 ✓	2430 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet				
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	1100 ✓	1880 ✓	* —	4340	5800 ✓
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	No
7	Limestone	No
8	Coal	No
1	limestone slurry feed	No
6	thickener underflow	No

* DATA NOT OBTAINED

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER ANGB DATE: 3/23/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	5.32 ✓ 4.82 ✓	1.14 ✓ 1.14 ✓	716 ✓	2100 ✓ 2220 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet	4.54 ✓	1.12 ✓	288 ✓	1890 ✓
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	1080 ✓	1810 ✓	— *	4020 ✓	6000 ✓
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	Yes
7	Limestone	No
8	Coal	Yes
1	limestone slurry feed	No
6	thickener underflow	No

* DATA NOT OBTAINED

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER DATE: 3/24/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.43 ✓ 4.94 ✓	1.14 ✓ 1.12 ✓	513 ✓	2320 ✓ 2090 ✓
2	Second Stage Level Tank In	5.06 ✓	1.11 ✓	564 ✓	1990 ✓
3	Mill Pump Outlet	4.78 ✓	1.11 ✓	419 ✓	1940 ✓
4	Thickener Inlet	4.45 ✓	1.10 ✓	180 ✓	2010 ✓
5	Thickener Overflow	4.24 ✓	NA. * ✓	60 ✓	2380 ✓
6	Thickener Underflow	4.57 ✓	1.18 ✓	290 ✓	2070 ✓

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	756 ✓	2970 ✓	0 ✓	7620 ✓	5000 ✓ ~~4900~~
2	Second Stage Level Tank In	822 ✓	2780 ✓	0 ✓	7490 ✓	5700 ✓ ~~5600~~
3	Mill Pump Outlet	728 ✓	2960 ✓	3 ✓	7790 ✓	6100 ✓ ~~6200~~
4	Thickener Inlet	762 ✓	2,980 ✓	47 ✓	8340 ✓	6100 ✓ ~~6200~~
5	Thickener Overflow	798 ✓	3100 ✓	0 ✓	8260 ✓	5400 ✓
6	Thickener Underflow	723 ✓	3020 ✓	0 ✓	7990 ✓	5900 ✓ ~~5800~~
9	Make Up Water	*	*	Not Required	Not Required	*

SEE 3-25-81

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	No
7	Limestone	No
8	Coal	Yes
1	Limestone Slurry feed	No
6	Thickener underflow	No

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacker

DATE: 3/25/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	5.14 ✓ 5.20 ✓	1.12 ✓ 1.12 ✓	684 ✓	2140 ✓ 2290 ✓
2	Second Stage Level Tank In		~~[illegible]~~		
3	Mill Pump Outlet	5.31 ✓	1.11 ✓	711 ✓	3280 ✓
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	863 ✓	2670 ✓	2 ✓	6640 ✓	~~4400~~ 4300 ✓
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water	112 ✓	32 ✓	Not Required	Not Required	<100 ✓

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	Yes.
7	Limestone	No
8	Coal	Yes
1	limestone slurry feed	No
6	thickener underflow	No

* DATA NOT OBTAINED

DAILY ANALYTICAL SUMMARY SHEET

SITE: Richenbacher DATE: 3-26-81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	5.19 ✓ 5.44 ✓	1.13 ✓ 1.13 ✓	703 ✓	2020 ✓ 2280 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet	5.50 ✓	1.11 ✓	771	2150 ✓
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	1030 ✓	1770 ✓	9 ✓	4600 ✓	*
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	
7	Limestone	
8	Coal	

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacke DATE: 3-27-81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	5.09 ✓ 4.93 ✓	1.13 ✓ 1.13 ✓	673 ✓	2420 ✓ 2190 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet	5.00 ✓	1.12 ✓	566 ✓	2180 ✓
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	1180 ✓	1630 ✓	0 ✓	3790 ✓	5100 ✓
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	
7	Limestone	
8	Coal	

DAILY ANALYTICAL SUMMARY SHEET

no samples taken This Date

SITE: Rickenbacker DATE: 3-28-81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed				
2	Second Stage Level Tank In				
3	Mill Pump Outlet				
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed					
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	
7	Limestone	
8	Coal	

DAILY ANALYTICAL SUMMARY SHEET

no samples Taken this date

SITE: Rickenbacker

DATE: 3-29-81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed				
2	Second Stage Level Tank In				
3	Mill Pump Outlet				
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed					
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	
7	Limestone	
8	Coal	

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacker

DATE: 3-30-81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.91 ✓ 4.84 ✓	1.09 ✓ 1.08 ✓	543 ✓	1890 ✓ 1950 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet	5.47 ✓	1.09 ✓	782 ✓	1960 ✓
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	1170 ✓	1370 ✓	1 ✓	3550 ✓	3600 ✓
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	
7	Limestone	
8	Coal	

NO DATA
SCRUBBER DOWN

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacker DATE: 3-31-81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed				
2	Second Stage Level Tank In				
3	Mill Pump Outlet				
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed					
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	
7	Limestone	
8	Coal	

DATA NOT OBTAINED
SCRUBBER WAS DOWN MOST
OF THE A.M.

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER ANGB DATE: 4/1/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	5.80 ✓ #	1.09 ✓ #	423 ✓	828 ✓ #
2	Second Stage Level Tank In				
3	Mill Pump Outlet	#	#	#	#
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	1060 ✓	802 ✓	# —	3090 ✓	1790 ✓
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

0.97

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	No
7	Limestone	No
8	Coal	No
1	limestone slurry feed	No
6	thickener underflow	No

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER AWGB DATE: 4/2/91

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	5.53 ✓ 5.44 ✓	1.13 ✓ 1.10 ✓	799 ✓	1990 ✓ 1910 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet	5.61 ✓	1.12 ✓	817 ✓	1950 ✓
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	1310 ✓	912 ✓	2 ✓	2610 ✓	1910 ✓
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

0.77

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	NO
7	Limestone	NO
8	Coal	Yes
1	Limestone slurry feed	No
6	thickener underflow	No

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER DATE: 4/3/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.71 ✓ 4.81 ✓	1.12 ✓ 1.14 ✓	441 ✓	2170 ✓ 2280 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet	5.06 ✓	1.15 ✓	692 ✓	2170 ✓
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l	
1	Limestone Slurry Feed	1320 ✓	742 ✓	1 ✓	2690 ✓	2000 ✓ 2350 ✓	0.89
2	Second Stage Level Tank In						
3	Mill Pump Outlet						
4	Thickener Inlet						
5	Thickener Overflow						
6	Thickener Underflow						
9	Make Up Water			Not Required	Not Required		

SOLIDS

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	Yes
7	Limestone	Yes
8	Coal	Yes
1	Limestone slurry feed	Yes
6	Thickener Underflow	Yes (not pumping to pond)

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacker DATE: 4-4-81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.47 ✓	1.15 ✓		2120 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet				
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	1260 ✓	939 ✓		2730 ✓	
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	
7	Limestone	
8	Coal	

DAILY ANALYTICAL SUMMARY SHEET

SITE: Rickenbacker DATE: 4-5-81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.56 ✓	1.15 ✓		2160 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet				
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed					
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	
7	Limestone	
8	Coal	

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER DATE: 4/6/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.83✓ 5.50✓	1.13✓ 1.12✓	552✓	2040✓ 2310✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet	5.49✓	1.12✓	941✓	2200✓
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	1230✓	1220✓	24✓	3470✓	2580✓
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

0.90

SOLIDS

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	Yes
7	Limestone	No
8	Coal	Yes
1	limestone slurry feed	No
6	Thickener underflow	No

* DATA NOT OBTAINED

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER DATE: 4/7/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	5.07 ✓ *	1.11 ✓ *	738 ✓	2830 ✓ *
2	Second Stage Level Tank In	5.02 ✓	1.09 ✓	730 ✓	2710 ✓
3	Mill Pump Outlet	5.09 ✓	1.08 ✓	781 ✓	2760 ✓
4	Thickener Inlet	4.81 ✓	1.06 ✓	560 ✓	3320 ✓
5	Thickener Overflow	5.05 ✓	— *	726 ✓	2830 ✓
6	Thickener Underflow	5.52 ✓	1.52 ✓ **	805 ✓	1750 ✓

** VALUE APPEARS UNUSUALLY HIGH

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l	
1	Limestone Slurry Feed	1510 ✓	1050 ✓	7 ✓	2880 ✓	2830 ✓	.86
2	Second Stage Level Tank In	1520 ✓	1080 ✓	7 ✓	2850 ✓	2900 ✓	0.86
3	Mill Pump Outlet	1520 ✓	1080 ✓	2 ✓	2740 ✓	2930 ✓	0.85
4	Thickener Inlet	1590 ✓	1090 ✓	90 ✓	3160 ✓	2960 ✓	0.88
5	Thickener Overflow	1490 ✓	1080 ✓	60 ✓	3040 ✓	2760 ✓	0.87
6	Thickener Underflow	1360 ✓	921 ✓	40 ✓	2570 ✓	2330 ✓	0.83
9	Make Up Water	*	*	Not Required	Not Required	*	see 4/8/81

SOLIDS

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	No
7	Limestone	No
8	Coal	Yes
1	limestone slurry feed	No
6	thickener underflow	No

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER DATE: 4/8/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	5.00 ✓ 5.09 ✓	1.12 ✓ 1.13 ✓	708 ✓	2700 ✓ 2900 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet	5.32 ✓	1.12 ✓	1030 ✓	2920 ✓
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l	
1	Limestone Slurry Feed	1340 ✓	1330 ✓	3 ✓	3320 ✓	3000 ✓	0.87
2	Second Stage Level Tank In						
3	Mill Pump Outlet						
4	Thickener Inlet						
5	Thickener Overflow						
6	Thickener Underflow						
9	Make Up Water	38.1 ✓	13.4 ✓	Not Required	Not Required	0	✓

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	Yes
7	Limestone	No
8	Coal	Yes
1	limestone slurry feed	No
6	thickener underflow	No

*DATA NOT OBTAINED

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER DATE: 4/9/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.71 ✓ 4.54 ✓	1.12 ✓ 1.13 ✓	501 ✓	2510 ✓ 2510 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet	4.39 ✓	1.13 ✓	191 ✓	2240 ✓
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

** DATA FROM BASE LAB

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	1130 ✓	1890	— *	3730 **	3300 ✓
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	No
7	Limestone	No
8	Coal	Yes
1	limestone slurry feed	Yes
6	thickener underflow	Yes (5 min after they pumped to the pond).

* DATA NOT OBTAINED

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER

DATE: 4/10/81

Point No.	Location	pH	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	Limestone Slurry Feed	4.60 ✓ 4.75 ✓	1.12 ✓ 1.12 ✓	357 ✓	2430 ✓ 2370 ✓
2	Second Stage Level Tank In				
3	Mill Pump Outlet	4.55 ✓	1.11 ✓	380 ✓	2340 ✓
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

** DATA FROM BASE LAB

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	Limestone Slurry Feed	1180 ✓	1960 ✓	— *	3740 **	3390 ✓
2	Second Stage Level Tank In					
3	Mill Pump Outlet					
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	—

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	Yes
7	Limestone	Yes
8	Coal	Yes
1	limestone slurry feed	No
6	thickener underflow	No

DAILY ANALYTICAL SUMMARY SHEET

SITE: RICKENBACKER

DATE: Audit Samples

Point No.	Location	pH ✓	Density g/ml.	Alkalinity as mg/l $CaCO_3$	Adipic Acid mg/l
1	[redacted] Audits	4.65 accepted 4.63	— no audit sample	477 ✓ accepted 486	2210 ✓ accepted 2174
2	Second Stage Level Tank In				
3	Mill Pump Outlet				
4	Thickener Inlet				
5	Thickener Overflow				
6	Thickener Underflow				

Point No.	Location	Calcium mg/l	Magnesium mg/l	Sulfite mg/l	Sulfate mg/l	Chloride mg/l
1	[redacted] Audits	2010 ✓ accepted 2003	487 ✓ accepted 505	1000 ✓ accepted 1001	2170 accepted 1997	4290 ✓ (Mixed) * 5390 ✓ (Cl⁻ only)
2	Second Stage Level Tank In					4330 ✓ (Mixed) ** 5580 ✓ (Cl⁻ only)
3	Mill Pump Outlet					accepted 4408 (MIXED) 5354 (Cl⁻ only)
4	Thickener Inlet					
5	Thickener Overflow					
6	Thickener Underflow					
9	Make Up Water			Not Required	Not Required	

SOLIDS

Point No.	Location	Was Sample Taken (Yes, No)
4	Thickener Inlet	NA
7	Limestone	
8	Coal	

* wet chemistry method

** Cl⁻ probe used

ANALYTICAL RESULTS

Client: USEPA RAFB

Sample received: 3-10-81
Results reported: 5-25-81
Attn:

Parameter	Units	Sample number				
		Thickener inlet Solid 2-11-81	Thickener inlet solid 2-12-81	Thickener inlet solid 2-18-81	Thickener inletsolid 2/25	Thickener inle Solid 2/27/81
PEDCo Sample Number	-	BR 752	BR 753	BR 754	BR 755	BR 756
Calcium	%	15.7 ✓	17.0 ✓	19.4 ✓	20.2 ✓	15.0 ✓
Magnesium	%	0.90 ✓	0.78 ✓	* 1.15 ✓	1.14 ✓	1.66 ✓
Total Sulfate	%	38.8 ✓	42.1 ✓	42.0 ✓	37.6 ✓	40.7 ✓
Carbonate, as CO_2	%	15.9 ✓	3.35 ✓	8.30 ✓	8.45 ✓	11.3 ✓
Acid Insolubles	%	6.79 ✓	5.77 ✓	5.04 ✓	2.57 ✓	2.17 ✓
Free Base as CaO	%	<0.03 ✓	<0.03 ✓	*	<0.03 ✓	<0.03 ✓

Comments: * = not requested

Submitted by: Ida Bennett

T.J.R.

COAL

ANALYTICAL RESULTS

Client: US EPA

RICKENBACKER COAL

As Rec'd

Sample received: 2-18-81

Results reported: 2-25-81 / 3-18-81

Attn: PN 3450-39

Parameter	Units	Sample number				
		2/12/81	2/13/81	2/14/81	2/16/81	
Air dry loss	%	4.70	4.96	4.30	5.14	
Moisture	%	3.66	3.57	3.81	3.70	
Ash	%	7.57	7.65	6.95	7.33	
Total sulfur	%	2.41	2.56	2.76	1.48	
Heating value	Btu/lb	12366	12206	12330	12357	
Volatile matter	%	41.65	41.54	41.71	37.47	
Fixed carbon	%	42.42	42.28	43.23	46.36	
Carbon	%	66.96	67.39	63.75	69.49	
Hydrogen	%	4.80	4.77	4.34	4.66	
Nitrogen	%	1.45	1.42	1.39	1.65	
Oxygen	%	8.45	7.68	12.70	6.55	
Chloride	%	.17	.19	.18	.18	
Ash fusion temperature	°F					
PEDCo Lab Number		BP 943	BP 944	BP 945	BP 946	
Basis		←	As Re	ceived	→	

Comments: T/k. Hydrogen and oxygen as received does not include hydrogen and oxygen as moisture.

COAL

ANALYTICAL RESULTS

Client: U.S. EPA
RICKENBACKER COAL - DRY

Sample received: 2-18-81
Results reported: 2-25-81 / 3-18-81
Attn:

Parameter	Units	Sample number				
		2/12/81	2/13/81	2/14/81	2/16/81	
Air dry loss	%	—	—	—	—	
Moisture	%					
Ash	%	8.26	8.37	7.56	8.04	
Total sulfur	%	2.62	2.80	3.00	1.62	
Heating value	Btu/lb	13494	13344	13418	13556	
Volatile matter	%	41.65	41.54	41.71	37.47	
Fixed carbon	%	50.09	50.09	50.73	54.49	
Carbon	%	73.06	73.67	69.37	76.23	
Hydrogen	%	5.24	5.22	4.72	5.11	
Nitrogen	%	1.58	1.56	1.51	1.81	
Oxygen	%	9.24	8.38	13.84	7.19	
Chloride	%	.19	.21	.20	.20	
Ash fusion temperature	°F					
PEDCo Lab Number		BP 943	BP 944	BP 945	BP 946	
Basis		← DRY →				

Comments: T.J.W.

ANALYTICAL RESULTS

Client: USEPA RAFB

Sample received: 3-3-81

Results reported: 3-24-81

Attn: TJW.

Parameter	Units	Sample Number					
		coal 2-17-81	coal 2-24-81	coal 2-17-81	coal 2-24-81		Bottom ash 2-19-81
PEDCo Lab Number	-	BR738	BR743	BR738	BR743		BR748
Air dry loss	%	7.32 ✓	11.10 ✓				<.10 ✓
Moisture	%	2.34 ✓	2.02 ✓				
Ash	%	7.50 ✓	6.94 ✓	8.29 ✓	7.97 ✓		
Total sulfur	%	2.27 ✓	1.42 ✓	2.51 ✓	1.64 ✓		.45 ✓
Heating value	Btu/lb	12219	11862	13499	13619		
Volatile matter	%	38.61 ✓	37.18 ✓	38.61 ✓	37.18 ✓		
Fixed carbon	%	44.23 ✓	42.76 ✓	53.10 ✓	54.85 ✓		
Carbon	%	67.62 ✓	64.71 ✓	74.71 ✓	74.29 ✓		
Hydrogen	%	4.76 ✓	4.62	5.26 ✓	5.30 ✓		
Nitrogen	%	1.48 ✓	1.51 ✓	1.64 ✓	1.74 ✓		
Oxygen	%	6.71 ✓	7.68 ✓	7.59 ✓	9.06 ✓		
Free swelling index	-						
Ash fusion temperature	°F						
Chloride	%	.17 ✓	.12 ✓	.18 ✓	.14 ✓		
Basis		← As Received →		← Dry →			As rec'd

Comments: Hydrogen and oxygen as received does not include hydrogen and oxygen as moisture.

ANALYTICAL RESULTS

Client: USEPA/RAFB

Sample received: 3-3-81
Results reported: 3-24-81
Attn:

Parameter	Units	Sample number				
		Limestone 2-20-81	Limestone 2-27-81			
PEDCo Sample Number	-	BR 749	BR 750			
Calcium	%	35.0	36.6			
Magnesium	%	2.39	2.88			
Potassium	%	0.054	0.062			
Sodium	%	0.025	0.018			
Acid Insolubles	%	1.52	0.79			

Comments:

Submitted by: Ida Luris Bennett T.J.W.

ANALYTICAL RESULTS

Client: USEPA RAFB

Sample received: 3-10-81
Results reported: 3-25-81
Attn:

Parameter	Units	Sample number				
		underflow Thickener solid 2/23				
PEDCo Sample Number	-	BR 757 ✓				
Calcium	%	14.4 ✓				
Magnesium	%	* 0.94 ✓				
Total Sulfate	%	41.6 ✓				
Acid Insolubles	%	3.93 ✓				
Free Base, as CaO	%	*				
arbonate, as CO_2	%	6.91 ✓				

Comments: *- not requested

Submitted by: Ida Bennett T.J.W.

ANALYTICAL RESULTS

Client: USEPA RAFB

Sample received: 3-10-81
Results reported: 3-25-81
Attn:

Parameter	Units	Sample number				
		THICKENER INLET SOLID WEEK OF 3/2/81	LIMESTONE SOLID 3-6-81	LIMESTONE SLURRY FEED LIQUID 3/6/81		
PEDCo Sample Number	-	BS222	BS223	BS224		
Calcium	%	22.5 ✓	30.6 ✓	*		
Magnesium	%	* 1.66 ✓	3.01 ✓	*		
Total Sulfate	%	38.9 ✓	*	*		
Carbonate, as CO_2	%	5.98 ✓	*	*		
Acid Insolubles	%	3.97 ✓	2.82 ✓	*		
Chloride	mg/L	*	*	4635 ✓		

Comments: * = not requested T.J.N.

Submitted by: Ida Bennett

ANALYTICAL RESULTS

Client: USEPA RAFB

Sample received: 3-27-81 / 4-17-81

Results reported:

Attn:

Parameter	Units	Sample number				
		Thickener Solids Composite 3/2, 3/4, 3/6		THICKENER INLET SOLIDS 4-16-81		
PEDCo Sample Number	-	BS222		BT 797	BT 797	
Free Carbon	%	2.10 ✓		1.92	2.63	
Moisture *	%	10.31 ✓		26.84	—	
				As Rec'd	Dry	

Comments: * after air drying.

Submitted by: Ida Barnett T.J.N.

ANALYTICAL RESULTS

Client: USEPA / RAFB

Sample received: 3-3-81

Results reported: 3-24-81

Attn:

Parameter	Units	Sample number				
		Limestone Slurry Feed Liquid Control				
PEDCo Sample Number	-	BR751				
Calcium		1328				
Magnesium	mg/l	1830				
Sulfate	mg/l	2240				
Chloride	mg/l	5240				

Comments:

Submitted by: Ida Juris Bennett T.J.W.

ANALYTICAL RESULTS

Client: USEPA RAFB

Sample received: 3-18-81

Results reported: 4-1-81

Attn:

Parameter	Units	Sample number				
		Thickener Inlet Solid 3/9, 3/11, 3/13	Thickener Underflow Solid 3-13-81	Limestone Slurry Feed Solid 3/12/81		
PEDCo Sample Number	-	BS547	BS548	BS549		
Calcium	%	25.1 ✓	23.6 ✓	23.4 ✓		
Carbonate, as CO_2	%	8.84 ✓	7.15 ✓	8.95 ✓		
Total Sulfate	%	38.0 ✓	37.5 ✓	38.4 ✓		
Acid Insolubles	%	4.52 ✓	4.70 ✓	4.65 ✓		

Comments:

Submitted by: Ida Bennett

ANALYTICAL RESULTS

Client: US EPA RAFB

Sample received: 3-18-81
Results reported: 3-31-81
Attn:

Parameter	Units	Sample number				
		Thickener inlet liq. 3-10-81	Thickener Overflow 3-10	2nd stage 3/10 level tank liquid	Limestone slurry feed 3-11	Limestone slurr feed 3-12
PEDCo Sample Number	-	BS 550	BS 551	BS 552	BS553	BS554
Calcium	mg/l	*	*	*	1780 ✓	1880 ✓
Magnesium	mg/l	*	*	*	459 ✓	497 ✓
Chloride	mg/l	3800 ✓	4020 ✓	3970 ✓	3770 ✓	3780 ✓

Comments: * not requested

Submitted by: Ida Bennett T.J.R.

ANALYTICAL RESULTS

Client: USEPA RAFB

Sample received: 3-20-81
Results reported: 3-31-81
Attn:

Parameter	Units	Sample number				
		Limestone 3-13-81				
PEDCo Sample Number	-	BS572				
Calcium	%	31.7 ✓				
Magnesium	%	2.82 ✓				
Acid Insolubles	%	4.06 ✓				

Comments:

Submitted by: Ida Bennett T.J.L.

ANALYTICAL RESULTS

Client: USEPA RAFB

Sample received: 3-26-81

Results reported: 4-1-81

Attn:

Parameter	Units	Sample number				
		THICKENER INLET SOLID 3/16, 3/18, 3/20/81	LIMESTONE SLURRY FEED SOLID 3/19/81			
PEDCo Sample Number	-	BS 662	BS 663			
Calcium	%	21.7 ✓	19.9 /			
Total Sulfate	%	40.4 /	44.0 /			
Carbonate, as CO_2	%	2.94 /	5.53 /			
Acid Insolubles	%	6.36 /	6.59 /			

Comments:

Submitted by: Ida Bennett

T.J.N.

ANALYTICAL RESULTS

Client: USEPA RAFB

Sample received: 3-23-81

Results reported: 4-1-81

Attn:

Parameter	Units	Sample number				
		LIMESTONE Solid 3/20/81	THICKENER UNDERFLOW Solid 3/20/81			
PEDCo Sample Number	-	BS591	BS592			
Calcium	%	31.3 ✓	20.8 ✓			
Magnesium	%	2.89 ✓	*			
Acid Insolubles	%	5.10 ✓	9.03 ✓			
Total Sulfate	%	*	38.3 ✓			
Carbonate, as CO_2	%	*	4.29 ✓			

Comments: * not requested

Submitted by: Ida Bennett

T.J.N.

ANALYTICAL RESULTS

Client: USEPA RAFB

Sample received: 3-30-81
Results reported: 4-13-81
Attn:

Parameter	Units	Sample number				
		Thickener inlet Solids 3/23 3/25 3-27	Thickener Under flow 3-27-81	Limestone Slurry feed solid 3-27-81	Limestone 3/27/81	
PEDCo Sample Number	-	BS 746	BS 747	BS748	BS 749	
Calcium	%	21.4 ✓	20.3 ✓	20.2 ✓	35.1 ✓	
Magnesium	%	*	*	*	2.52 ✓	
Total Sulfate	%	41.7 ✓	40.8 ✓	42.9 ✓	*	
Carbonate, as CO_2	%	11.8 ✓	11.4 ✓	11.2 ✓	*	
Acid Insolubles	%	3.29 ✓	2.63 ✓	3.35 ✓	2.14 ✓	

Comments: * not requested

Submitted by: Ida Bennett T.J.W.

ANALYTICAL RESULTS

Client: USEPA RAFB

Sample received: 4-7-81
Results reported: 4-14-81
Attn:

Parameter	Units	Sample number				
		Limestone 4-3-81	Thickener Underflow Solids 4-3-81	Limestone Slurry Feed Solids 4-3-81	Thickener Inlet Solids - composite 3/30, 4/3	
PEDCo Sample Number	-	BT287	BT288	BT289	BT240	
Calcium	%	32.1 ✓	17.8 ✓	16.0 ✓	16.9 ✓	
Magnesium	%	2.58 ✓	*	*	*	
Acid Insolubles	%	2.04 ✓	1.98 ✓	2.30 ✓	2.22 ✓	
Total Sulfate	%	*	41.0 ✓	41.1 ✓	40.7 ✓	
Carbonate, as CO_2	%	*	4.22 ✓	5.62 ✓	4.74 ✓	

Comments: * not requested

Submitted by: Ida Bennett T.J.N.

ANALYTICAL RESULTS

Client: USEPA RAFB

Sample received: 4-13-81

Results reported: 5-6-81

Attn:

Parameter	Units	Sample number				
		Limestone Slurry Feed Solid 4-9-81	Thickener solid solid 4-6-#10-81	Thickener Underflow Solid 4-9-81	Limestone 4-10-81	
PEDCo Sample Number	-	BT425	BT427	BT428	BT424	
Calcium	%	15.2 ✓	14.9 ✓	14.8 ✓	31.6 ✓	
Magnesium	%	*	*	*	2.58 ✓	
Total Sulfate	%	43.5 ✓	62.6 ✓	40.8 ✓	*	
Carbonate, as CO_2	%	11.8 ✓	13.8 ✓	10.4 ✓	*	
Acid Insolubles	%	2.94 ✓	3.20 ✓	3.63 ✓	2.50 ✓	

Comments: * not requested

Submitted by: Ida Bennett

T.J.N.

ANALYTICAL RESULTS

Client: USEPA RAFB

Sample received: 4-13-81

Results reported: 4-28-81

Attn:

Parameter	Units	Sample number				
		LIMESTONE SLURRY FEED LIQUID 4-10-81	LIMESTONE SLURRY FEED LIQUID (1:10) 4-10-81	LIMESTONE SLURRY FEED LIQUID (1:10) 4-9-81		
PEDCo Sample Number	-	BT 410	BT411	BT412		
Calcium	mg/l	1170 ✓	*	*		
Magnesium	mg/l	1690 ✓	*	*		
Total Sulfate	mg/l	3640 ✓	(3740) ° 374 ✓	(3730) ° 373 ✓		
Chloride	mg/l	3384 ✓	*	*		
		audit of Field LAB				

Comments: * not requested

° results of sample as received.

Submitted by: Ida Bennett T.J.W.

ANALYTICAL RESULTS

Client: USEPA RAFB

Sample received: 4-17-81

Results reported: 5-5-81

Attn:

Parameter	Units	Sample number				
		4-16-81 10:40 A.M. Thickener Inlet liquid				
PEDCo Sample Number	-	BT802				
Calcium	mg/l	1420 ✓				
Magnesium	mg/l	1050 ✓				
Total Sulfate	mg/l	2120 ✓				
Chloride	mg/l	3400 ✓				
pH	s.u.	5.11 ✓				
Total Alkalinity, as $CaCO_3$	mg/l	172 ✓				

Comments:

Submitted by: Ida Bennett T.J.N

ANALYTICAL RESULTS

Client: USEPA RAFB

Sample received: 4-17-81

Results reported: 5-6-81

Attn:

Parameter	Units	Sample number				
		Thickener Inlet Solid 4-16-81	8:00PM 4-16-81 Limestone Slurry Feed Solid	10:40 4-16-81 Limestone Slurry Feed Solid	4-16-81 3:00P.M Limestone Slurry Feed Liq.	10:40A.M 4-16-81 Limestone Slurry Feed Liq.
PEDCo Sample Number	-	BT 797	BT 798	BT 799	BT 800	BT 801
Calcium	%	21.7 ✓	18.9 ✓	22.0 ✓	**	**
Magnesium	%	1.46 ✓	1.77 ✓	1.35 ✓	**	**
Total Sulfate	%	43.9 ✓	38.3 ✓	42.7 ✓	**	**
Carbonate, as $CO_3^=$	%	9.48 ✓	14.4 ✓	12.6 ✓	*	*
Acid Insolubles	%	3.51 ✓	3.49 ✓	3.16 ✓	*	*
Calcium	mg/l	**	**	**	1460 ✓	1520 ✓
Magnesium	mg/l	**	**	**	1020 ✓	1060 ✓
Total Sulfate	mg/l	**	**	**	2300 ✓	2380 ✓
Chloride	mg/l	*	*	*	3430 ✓	3500 ✓

Comments: ** see another units section

* not requested

Submitted by: Ida Bennett T.J.W.

COAL
ANALYTICAL RESULTS

Client: USEPA RAFB

Sample received: 3-10-81

Results reported: 3-30-81

Attn:

Parameter	Units	Sample Number					
		Coal 3/2-3/6	Coal 3/2-3/6				
PEDCo Lab Number	-	BS221	BS221				
Moisture, Total	%	8.62					
Ash	%	9.88	10.81				
Total sulfur	%	2.61	2.86				
Heating value	Btu/lb	11882	13004				
Volatile matter	%	35.63	38.99				
Fixed carbon	%	45.87	50.20				
Carbon	%	65.32	71.48				
Hydrogen	%	4.91	5.37				
Nitrogen	%	1.41	1.54				
Oxygen	%	7.08	7.76				
Chlorine	%	.17	.18				
Basis		As rec'd	Dry				

Comments: Hydrogen and oxygen in as received does not include hydrogen and oxygen as moisture.

T.J.W.

COAL
ANALYTICAL RESULTS

Client: USEPA RAFB

Sample received: 3-20-81

Results reported: 4-10-81

Attn:

Parameter	Units	Sample Number					
		coal composite 3/9 - 3/13	coal composite 3/9 - 3/13				
PEDCo Lab Number	-	B5571	B5571				
Moisture, Total	%	7.92					
Ash	%	8.91	9.67				
Total sulfur	%	3.26	3.55				
Heating value	Btu/lb	12075	13114				
Volatile matter	%	35.99	39.08				
Fixed carbon	%	47.18	51.25				
Carbon	%	66.47	72.19				
Hydrogen	%	4.78	5.19				
Nitrogen	%	1.43	1.56				
Oxygen	%	7.12	7.72				
Chlorine, as chloride	%	.11	.12				
Basis		As Rec'd	Dry				

Comments: Hydrogen and oxygen in as received sample does not include hydrogen and oxygen as moisture.

T.J.W.

COAL
ANALYTICAL RESULTS

Client: USEPA RAFB

Sample received: 3-23-81

Results reported: 4-10-81

Attn:

Parameter	Units	Sample Number					
		Coal Composite 3/16 - 3/20	Coal Composite 3/16 - 3/20				
PEDCo Lab Number	-	BS 590	BS 590				
Moisture, Total	%	8.35					
Ash	%	6.56	7.16				
Total sulfur	%	2.61	2.85				
Heating value	Btu/lb	12455	13590				
Volatile matter	%	37.41	40.82				
Fixed carbon	%	47.68	52.02				
Carbon	%	68.72	74.98				
Hydrogen	%	4.92	5.37				
Nitrogen	%	1.51	1.65				
Oxygen	%	7.19	7.83				
Chlorine, as chloride	%	.14	.16				
Basis		As Rec'd	Dry				

Comments: Hydrogen and oxygen in as received sample does not include hydrogen and oxygen as moisture.

T.J.N.

COAL
ANALYTICAL RESULTS

Client: U.S.EPA RAEB

Sample received: 3-30-81

Results reported: 4-28-81

Attn:

Parameter	Units	Sample Number					
		Coal 3/23 -	comp. 3/27/81				
PEDCo Lab Number	-	BS 745	BS 745				
Moisture, Total	%	6.99	—				
Ash	%	7.11	7.65				
Total sulfur	%	2.52	2.70				
Heating value	Btu/lb	12396	13328				
Volatile matter	%	37.22	40.01				
Fixed carbon	%	48.68	52.34				
Carbon	%	67.54	72.61				
Hydrogen	%	3.38	3.64				
Nitrogen	%	1.43	1.54				
Oxygen	%	10.95	11.77				
Chlorine	%	0.08	0.09				
Basis		As rec'd	Dry				

Comments: Hydrogen and oxygen in as received Sample does not include hydrogen and oxygen as moisture.

T.J.N.

COAL
ANALYTICAL RESULTS

Client: USEPA RAFB

Sample received: 4-7-81

Results reported: 4-28-81

Attn:

Parameter	Units	Sample Number					
		Coal 3/30, 4/3	comp. , 4/2				
PEDCo Lab Number	-	BT286	BT286				
Moisture, Total	%	6.35	—				
Ash	%	6.04	6.45				
Total sulfur	%	2.55	2.73				
Heating value	Btu/ lb	12574	13427				
Volatile matter	%	38.00	40.58				
Fixed carbon	%	49.61	52.97				
Carbon	%	69.42	74.13				
Hydrogen	%	4.99	5.33				
Nitrogen	%	1.40	1.49				
Oxygen	%	9.17	9.78				
Chlorine	%	0.08	0.09				
Basis		As rec'd	Dry				

Comments: Hydrogen and oxygen in as received sample does not include hydrogen and oxygen as moisture.

T.J.N.

COAL
ANALYTICAL RESULTS

Client: USEPA RAFB

Sample received: 4-13-81

Results reported: 4-28-81

Attn:

Parameter	Units	Sample Number					
		Coal 4/6 - 4/10 1981					
PEDCo Lab Number	-	BT426	BT426				
Moisture, Total	%	4.26	—				
Ash	%	5.64	5.89				
Total sulfur	%	2.13	2.22				
Heating value	Btu/lb	13361	13955				
Volatile matter	%	39.19	40.93				
Fixed carbon	%	50.91	53.18				
Carbon	%	72.28	75.50				
Hydrogen	%	5.37	5.61				
Nitrogen	%	1.60	1.67				
Oxygen	%	8.61	8.99				
Chlorine	%	0.11	0.12				
Basis		As rec'd	Dry				

Comments: Hydrogen and oxygen in as received sample does not include hydrogen and oxygen as moisture.

T.J.N.

COAL
ANALYTICAL RESULTS

Client: USEPA RAFB
Final Sample

Sample received: 4-17-81

Results reported: 4-28-81

Attn:

Parameter	Units	Sample Number					
		Coal sample 4-16-81	Coal sample 4-16-81		Thickener Solid 4-16-81 Baseline	Inlet	
PEDCo Lab Number	-	BT796	BT796		BT797	BT797	
Moisture, Total	%	5.17	—		26.84	—	
Ash	%	7.43	7.83		*	*	
Total sulfur	%	2.94	3.10		*	*	
Heating value	Btu/lb	12836	13536		*	*	
Volatile matter	%	38.19	40.27		*	*	
Fixed carbon	%	49.21	51.90		*	*	
Carbon	%	70.31	74.14		1.92	2.63	
Hydrogen	%	5.14	5.42		*	*	
Nitrogen	%	1.57	1.65		*	*	
Oxygen	%	7.37	7.79		*	*	
Chlorine	%	0.07	0.07		*	*	
Basis		As Rec'd	Dry		As rec'd	Dry	

Comments: Hydrogen and oxygen in as received sample does not include hydrogen and oxygen as moisture.
BT797 Moisture as determined : 7.60 %
* not requested

T.J.W.

APPENDIX E

DAILY BOILER DATA FROM PANEL BOARD READINGS

PN 3450-39

BOILER DATA

Recorded by GB & SS

Date 2-18 1981

Sheet 1 of 1

Military Time	14:30					
Unit 8						
Water In, °F	260					
Water Out, °F	395					
Flow, ~~gpm~~ /1000 lb/hr	420					
O_2	12.9					
BTU/hr, 10^6						
Unit 7						
Water In, °F	335					
Water Out, °F	420					
Flow, 1000 lb/hr	300					
BTU/hr, 10^6						
Unit 6						
Water In, °F	320					
Water Out, °F	405					
Flow, 1000 lb/hr	270					
Btu/hr, 10^6						
Unit 5						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by ____________

Date 2-19 1981

Sheet 1 of 1

Military Time	7:45	14:45				
Unit 8						
Water In, °F	280	310				
Water Out, °F	400	390				
Flow, 1000 lb/hr	422.5	445				
O_2	12.5	11.5				
BTU/hr, 10^6						
Unit 7						
Water In, °F	285	320				
Water Out, °F	450	420				
Flow, 1000 lb/hr	280	280				
BTU/hr, 10^6						
Unit 6						
Water In, °F	300					
Water Out, °F	380					
Flow, 1000 lb/hr	305					
Btu/hr, 10^6						
Unit 5						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by ____________

Date 2-20 1981

Sheet 1 of 1

Military Time	10:30	13:30	18:10			
Unit 8						
Water In, °F	300	280	280			
Water Out, °F	380	400	390			
Flow, gpm	450	450	450			
O_2	13	14	14			
BTU/hr, 10^6	54	53	42			
Unit 7						
Water In, °F	300	310	320			
Water Out, °F	400	400	410			
Flow, 1000 lb/hr	275	275				
BTU/hr, 10^6	27	25				
Unit 6						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
Btu/hr, 10^6						
Unit 5 on @ 9:20						
Water In, °F	300	315	320			
Water Out, °F	400	410	380			
Flow, 1000 lb/hr	280	270	300			
BTU/hr, 10^6	28	24	18			
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by PAC

Date 2/21/22 1981

Sheet 1 of 1

Military Time	2/21 15:00	2/22 15:30				
Unit 8						
Water In, °F	265	275				
Water Out, °F	360	400				
Flow, ~~gpm~~ #/hr	450,000	450000				
O_2	13	10.5				
BTU/hr, 10^6	42.6	48				
Unit 7						
Water In, °F	280	300				
Water Out, °F	420	440				
Flow, 1000 lb/hr	—	—				
BTU/hr, 10^6	25.5	22.5				
Unit 6						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
Btu/hr, 10^6						
Unit 5						
Water In, °F	160	325				
Water Out, °F	390	415				
Flow, 1000 lb/hr	250	275				
BTU/hr, 10^6	26.1	26.0				
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by SRS

Date 2/23 1981

Sheet 1 of 1

Military Time	9:15	13:10	16:20	17:50		
Unit 8		Shut down				
Water In, °F	280	~~270~~				
Water Out, °F	400	~~330~~				
Flow, gpm	460,000					
O_2	19	~~19~~				
BTU/hr, 10^6	54.6	~~110~~				
Unit 7						
Water In, °F	315	295	~~240~~	305		
Water Out, °F	420	380	390	400		
Flow, 1000 lb/hr	300	300	-	300		
BTU/hr, 10^6	31.5	25.5	40	28.5		
Unit 6						
Water In, °F		~~295~~		305		
Water Out, °F		~~405~~	395	410		
Flow, 1000 lb/hr		Starting up				
Btu/hr, 10^6			20			
Unit 5						
Water In, °F	320	300	ON	310		
Water Out, °F	420	410		410		
Flow, 1000 lb/hr	295	295		300		
BTU/hr, 10^6	29.5	32.5		30.0		
Unit 4						
Water In, °F		Starting up	ON	360		
Water Out, °F				400		
Flow, 1000 lb/hr				300		
BTU/hr, 10^6				270		

PN 3450-39

BOILER DATA

Recorded by Steve Sabatini

Date 2/24 1981

Sheet 1 of 1

Military Time	8:40	10:15	12:50	17:42		
Unit 8						
Water In, °F						
Water Out, °F						
Flow, gpm						
O_2						
BTU/hr, 10^6						
Unit 7						
Water In, °F	305		305	305		
Water Out, °F	390		390	410		
Flow, 1000 lb/hr	300		300	300		
BTU/hr, 10^6	25.5		25.5	31.5		
Unit 6						
Water In, °F	305		305	305		
Water Out, °F	410		390	390		
Flow, 1000 lb/hr	300		300	300		
Btu/hr, 10^6	31.5		25.5	25.5		
Unit 5						
Water In, °F	310		310	310		
Water Out, °F	410		410	410		
Flow, 1000 lb/hr	300		300	300		
BTU/hr, 10^6	30.0		30.0	30.0		
Unit 4						
Water In, °F	305		305	305		
Water Out, °F	390		~~390~~ 420	410		
Flow, 1000 lb/hr	300		300	300		
BTU/hr, 10^6	25.5		34.5	31.5		

PN 3450-39

BOILER DATA

Recorded by Steve Sabatini

Date 2/25 1981

Sheet 1 of 1

Military Time	8:20	13:45	17:12			
Unit 8						
Water In, °F						
Water Out, °F						
Flow, gpm						
O_2						
BTU/hr, 10^6						
Unit 7						
Water In, °F	300	310	315			
Water Out, °F	400	400	415			
Flow, 1000 lb/hr	300	300	300			
BTU/hr, 10^6	30.0	27.0	300			
Unit 6						
Water In, °F	300	310	315			
Water Out, °F	400	405	405			
Flow, 1000 lb/hr	305	305	310			
Btu/hr, 10^6	30.5	29.0	27.9			
Unit 5						
Water In, °F	305	315	320			
Water Out, °F	410	410	410			
Flow, 1000 lb/hr	265	270	275			
BTU/hr, 10^6	27.8	25.7	24.8			
Unit 4						
Water In, °F	305	315	320			
Water Out, °F	410	410	420			
Flow, 1000 lb/hr	275	275	275			
BTU/hr, 10^6	28.9	26.1	27.5			

PN 3450-39

BOILER DATA

Recorded by Sabatini

Date 2/26 1981

Sheet 1 of 1

Military Time	06:50	11:13	13:48	16:13		
Unit 8						
Water In, °F						
Water Out, °F						
Flow, gpm						
O_2						
BTU/hr, 10^6						
Unit 7						
Water In, °F	295	300	305	310		
Water Out, °F	400	395	400	395		
Flow, 1000 lb/hr	290	300	300	300		
BTU/hr, 10^6	30.5	28.5	28.5	25.5		
Unit 6						
Water In, °F	295	300	305	310		
Water Out, °F	405	400	405	410		
Flow, 1000 lb/hr	~~305~~ 290	305	305	305		
Btu/hr, 10^6	31.9	30.5	30.5	30.5		
Unit 5						
Water In, °F	300	305	310	315		
Water Out, °F	380	410	410	400		
Flow, 1000 lb/hr	275	280	280	280		
BTU/hr, 10^6	22.0	29.4	280	23.8		
Unit 4						
Water In, °F	300	305	310	310		
Water Out, °F	420	400	405	400		
Flow, 1000 lb/hr	295	275	275	275		
BTU/hr, 10^6	33.0	26.1	26.1	24.8		

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 2/27 1981

Sheet 1 of 1

Military Time	07:35	10:15	14:20	17:35		
Unit 8						
Water In, °F						
Water Out, °F						
Flow, gpm						
O_2						
BTU/hr, 10^6						
Unit 7						
Water In, °F	305	310	315	315		
Water Out, °F	405	~~405~~ 375	420	400		
Flow, 1000 lb/hr	300	300	300	300		
BTU/hr, 10^6	30.0	19.5	31.5	25.5		
Unit 6						
Water In, °F	305	310	315	315		
Water Out, °F	415	405	410	410		
Flow, 1000 lb/hr	305	305	305	300		
Btu/hr, 10^6	33.6	29.0	29.0	28.5		
Unit 5						
Water In, °F	310	315	320	320		
Water Out, °F	410	415	420	410		
Flow, 1000 lb/hr	275	275	275	300		
BTU/hr, 10^6	27.5	27.5	27.5	27.0		
Unit 4						
Water In, °F	310	315	315	320		
Water Out, °F	405	420	420	405		
Flow, 1000 lb/hr	275	275	275	300		
BTU/hr, 10^6	26.1	28.9	28.9	25.5		

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 2/28 1981

Sheet 1 of 1

Military Time	07:55	11:00				
Unit 8						
Water In, °F						
Water Out, °F						
Flow, gpm						
O_2						
BTU/hr, 10^6						
Unit 7						
Water In, °F	305	310				
Water Out, °F	380	390				
Flow, 1000 lb/hr	300	?				
BTU/hr, 10^6	22.5	–				
Unit 6						
Water In, °F	305	310				
Water Out, °F	400	410				
Flow, 1000 lb/hr	305	?				
Btu/hr, 10^6	29.0	–				
Unit 5						
Water In, °F	310	315				
Water Out, °F	410	410				
Flow, 1000 lb/hr	275	?				
BTU/hr, 10^6	27.5	–				
Unit 4						
Water In, °F	305	315				
Water Out, °F	400	410				
Flow, 1000 lb/hr	275	?				
BTU/hr, 10^6	26.1	–				

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 3/1 1981

Sheet ____ of ____

Military Time	08:24	16:50				
Unit 8						
Water In, °F						
Water Out, °F						
Flow, gpm						
O_2						
BTU/hr, 10^6						
Unit 7						
Water In, °F	340	315				
Water Out, °F	390	400				
Flow, 1000 lb/hr	295	300				
BTU/hr, 10^6	23.6	28.5				
Unit 6						
Water In, °F	340	315				
Water Out, °F	410	410				
Flow, 1000 lb/hr	295	300				
Btu/hr, 10^6	29.5	28.5				
Unit 5						
Water In, °F	310	320				
Water Out, °F	410	400				
Flow, 1000 lb/hr	295	300				
BTU/hr, 10^6	29.5	24.0				
Unit 4						
Water In, °F	310	320				
Water Out, °F	410	400				
Flow, 1000 lb/hr	295	300				
BTU/hr, 10^6	29.5	240				

PN 3450-39

BOILER DATA

Recorded by Sabatini

Date 3/2 1981

Sheet 1 of 1

Military Time	08:00	12:20	16:00	18:15		
Unit 8						
Water In, °F	~~[illegible]~~		275	275		
Water Out, °F			400	395		
Flow, ~~gpm~~ lb/hr.			450	455		
O_2 %			19.5	20		
BTU/hr, 10^6			51.6	52.2		
Unit 7			out			
Water In, °F	310	310	~~280~~			
Water Out, °F	390	400				
Flow, 1000 lb/hr	295	300				
BTU/hr, 10^6	23.6	27.0				
Unit 6			out			
Water In, °F	310	310	~~270~~			
Water Out, °F	420	400				
Flow, 1000 lb/hr	295	300				
Btu/hr, 10^6	32.5	27.0				
Unit 5						
Water In, °F	315	315	315	310		
Water Out, °F	400	405	410	415		
Flow, 1000 lb/hr	295	300	300	300		
BTU/hr, 10^6	25.1	27.0	28.5	28.5		
Unit 4						
Water In, °F	310	310	310	310		
Water Out, °F	400	400	410	415		
Flow, 1000 lb/hr	295	275	275	300		
BTU/hr, 10^6	26.6	24.8	27.5	28.5		

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 3/3 1981

Sheet 1 of 1

Military Time	07:45	9:30	15:05			
Unit 8						
Water In, °F	260					
Water Out, °F	395					
Flow, ~~gpm~~ 1000 lb/hr.	450	✓	✓			
O_2 %	20					
BTU/hr, 10^6	60.0					
Unit 7						
Water In, °F	X	X	X			
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F	X	X	X			
Water Out, °F						
Flow, 1000 lb/hr						
Btu/hr, 10^6						
Unit 5						
Water In, °F	295					
Water Out, °F	400					
Flow, 1000 lb/hr	275	✓	✓			
BTU/hr, 10^6	28.9					
Unit 4						
Water In, °F	290					
Water Out, °F	390	✓	✓			
Flow, 1000 lb/hr	275					
BTU/hr, 10^6	27.5					
		G.B.	G.B.			

PN 3450-39

BOILER DATA

Recorded by Sebatini

Date 3/4 1981

Sheet 1 of 1

Military Time	07:50	13:14				
Unit 8						
Water In, °F	275					
Water Out, °F	395					
Flow, 1000 lb/hr	450	✓				
O_2	20					
BTU/hr, 10^6	54.6					
Unit 7						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
Btu/hr, 10^6						
Unit 5						
Water In, °F	305					
Water Out, °F	405	✓				
Flow, 1000 lb/hr	—					
BTU/hr, 10^6	—					
Unit 4						
Water In, °F	305					
Water Out, °F	405					
Flow, 1000 lb/hr	—	✓				
BTU/hr, 10^6	—					
	S.S.	G.B.				

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 3/5 1981

Sheet 1 of 1

Military Time	07:20	14:15	18:50			
Unit 8						
Water In, °F	265	280	280			
Water Out, °F	400	390	400			
Flow, ~~gpm~~ 1000 lb/hr.	450	450	400			
O_2 %	19	19.5	20			
BTU/hr, 10^6	60.0	46.2	48.0			
Unit 7						
Water In, °F						
Water Out, °F		~~400~~				
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F		315	315			
Water Out, °F		400	415			
Flow, 1000 lb/hr		305	295			
Btu/hr, 10^6		25.9	29.5			
Unit 5						
Water In, °F	300	320	320			
Water Out, °F	390	420	420			
Flow, 1000 lb/hr	275	305	295			
BTU/hr, 10^6	24.8	27.5	29.5			
Unit 4						
Water In, °F	300	320	315			
Water Out, °F	390	415	410			
Flow, 1000 lb/hr	275	280	295			
BTU/hr, 10^6	24.8	26.6	28.0			

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 3/6 1981

Sheet ____ of ____

Military Time	07:35	14:15	17:00			
Unit 8						
Water In, °F	270	285	285			
Water Out, °F	395	395	400			
Flow, ~~gpm~~ 1000 lb/hr	400	405	405			
O_2 %	20	20	20			
BTU/hr, 10^6	51.0	43.8	45.6			
Unit 7						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F	300	320	320			
Water Out, °F	380	410	420			
Flow, 1000 lb/hr	305	305	305			
Btu/hr, 10^6	24.4	27.5	30.5			
Unit 5						
Water In, °F	300	325	325			
Water Out, °F	400	420	405			
Flow, 1000 lb/hr	270	270	270			
BTU/hr, 10^6	27.0	25.7	21.6			
Unit 4						
Water In, °F	300	320	320			
Water Out, °F	380	400	410			
Flow, 1000 lb/hr	280	286	280			
BTU/hr, 10^6	22.4	22.4	25.2			

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 3/7/81 ~~1981~~

Sheet 1 of 1

Military Time	13:40	17.15				
Unit 8						
Water In, °F	290	275				
Water Out, °F	405	400				
Flow, ~~gpm~~ 1000 lb/hr	385	390				
O_2	20	20				
BTU/hr, 10^6	48.6	39.3				
Unit 7						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F	320	320				
Water Out, °F	410	410				
Flow, 1000 lb/hr	300	300				
Btu/hr, 10^6	27.0	27.0				
Unit 5						
Water In, °F	325	325				
Water Out, °F	415	410				
Flow, 1000 lb/hr	270	300				
BTU/hr, 10^6	24.3	25.5				
Unit 4						
Water In, °F	320	320				
Water Out, °F	420	410				
Flow, 1000 lb/hr	275	300				
BTU/hr, 10^6	27.5	27.0				

PN 3450-39

BOILER DATA

Recorded by S Sabatini

Date 3/8 1981

Sheet 1 of 1

Military Time	14:45	16:40				
Unit 8						
Water In, °F	290	295				
Water Out, °F	405	405				
Flow, ~~gpm~~ 1000lb/hr	395	395				
O_2	20	20				
BTU/hr, 10^6	47.4	45.0				
Unit 7						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F	325	325				
Water Out, °F	420	425				
Flow, 1000 lb/hr	300	300				
Btu/hr, 10^6	28.5	30.0				
Unit 5						
Water In, °F	330	335				
Water Out, °F	415	415				
Flow, 1000 lb/hr	265	300				
BTU/hr, 10^6	22.5	24.0				
Unit 4						
Water In, °F	320	320				
Water Out, °F	420	400				
Flow, 1000 lb/hr	275	300				
BTU/hr, 10^6	27.5	24.0				

PN 3450-39

BOILER DATA

Recorded by S Sabatini

Date 3/9 1981

Sheet 1 of 1

Military Time	08:15	11:00	14:30	17:00		
Unit 8						
Water In, °F	255	260	290	290		
Water Out, °F	395	405	400	400		
Flow, ~~gpm~~ 1000 lb/hr.	390 ~~[illegible]~~	~~430~~ 395	400	400		
O_2	20	20	20	13		
BTU/hr, 10^6	46.8	54.0	45.0	45.0		
Unit 7						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F	310	320	325	325		
Water Out, °F	410	410	405	410		
Flow, 1000 lb/hr	295	305	305	305		
Btu/hr, 10^6	29.5	27.5	24.4	25.9		
Unit 5						
Water In, °F	315	325	335	330		
Water Out, °F	390	410	415	410		
Flow, 1000 lb/hr	270	270	270	270		
BTU/hr, 10^6	20.3	23.0	21.6	21.6		
Unit 4						
Water In, °F	315	320	325	325		
Water Out, °F	345	390	420	405		
Flow, 1000 lb/hr	295	295	275	275		
BTU/hr, 10^6	—	19.3	26.1	22.0		

Boiler 4
was down ~~out~~ to clean windbox

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 3/10 1981

Sheet 1 of 1

Military Time	08:25	11:15	14:30	18:15		
Unit 8						
Water In, °F	~~285~~ 320	~~290~~ 325	~~285~~ 320	~~[illegible]~~ 320		
Water Out, °F	400	405	400	400		
Flow, ~~gpm~~ 1000 lb/hr.	390	390	~~[illegible]~~ 395	400		
O_2	13	12.5	12	12		
BTU/hr, 10^6	45.0	47.4	47.4	48.0		
Unit 7						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F	320	325	320	320		
Water Out, °F	420	425	~~410~~ 390	390		
Flow, 1000 lb/hr	305	305	305	305		
Btu/hr, 10^6	30.5	30.5	21.4	21.4		
Unit 5						
Water In, °F	325	330	325	325		
Water Out, °F	410	400	390	390		
Flow, 1000 lb/hr	280	270	270	265		
BTU/hr, 10^6	23.8	18.9	17.6	17.2		
Unit 4						
Water In, °F	325	325	325	325		
Water Out, °F	410	400	390	390		
Flow, 1000 lb/hr	275	275	275	275		
BTU/hr, 10^6	23.4	20.6	17.9	17.9		

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 3/11 1981

Sheet 1 of 1

Military Time	10:35	13:50	17:45			
Unit 8						
Water In, °F	285	285	280			
Water Out, °F	405	465	405			
Flow, 1000 lb/hr.	395	395	395			
O_2	10	11	11			
BTU/hr, 10^6	54.0	51.6	51.0			
Unit 7						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F	310	315	310			
Water Out, °F	395	395	390			
Flow, 1000 lb/hr	305	305	305			
Btu/hr, 10^6	25.9	24.4	24.4			
Unit 5						
Water In, °F	315	320	315			
Water Out, °F	395	395	390			
Flow, 1000 lb/hr	270	270	270			
BTU/hr, 10^6	21.6	20.3	20.3			
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 3/12 1981

Sheet 1 of 1

Military Time	08:15	10:56	13:40	18:35		
Unit 8						
Water In, °F	270	275	280	280		
Water Out, °F	400	400	400	400		
Flow, ~~gpm~~ 1000 lb/hr.	395	395	395	395		
O_2	11	12	12	12		
BTU/hr, 10^6	53.4	50.4	49.2	48.6		
Unit 7						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F	300	315	315	315		
Water Out, °F	380	395	390	380		
Flow, 1000 lb/hr	310	310	310	310		
Btu/hr, 10^6	24.8	24.8	23.3	20.2		
Unit 5						
Water In, °F	305	315	320	320		
Water Out, °F	380	395	396	380		
Flow, 1000 lb/hr	270	270	270	270		
BTU/hr, 10^6	20.3	21.6	18.9	16.2		
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S. Sebatini

Date 3/13 1981

Sheet 1 of 1

Military Time	08:15	13:55	17:05			
Unit 8						
Water In, °F	275	280	280			
Water Out, °F	395	405	395			
Flow, ~~gpm~~ 1000 lb/hr	390	395	400			
O_2 %	12	11	12			
BTU/hr, 10^6	49.8	50.4	48.0			
Unit 7						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F	310	315	315			
Water Out, °F	385	390	390			
Flow, 1000 lb/hr	305	305	300			
Btu/hr, 10^6	22.9	22.9	22.5			
Unit 5						
Water In, °F	315	320	320			
Water Out, °F	385	390	390			
Flow, 1000 lb/hr	270	270	300			
BTU/hr, 10^6	18.9	18.9	21.0			
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by D. Etson

Date March 14 1981

Sheet 1 of 1

Military Time	1045	1515				
Unit 8						
Water In, °F	300	300				
Water Out, °F	420	410				
Flow, gpm	395	395				
O_2	11.1	12.5				
BTU/hr, 10^6	51	48				
Unit 7						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F	310	315				
Water Out, °F	390	385				
Flow, 1000 lb/hr	305	310				
Btu/hr, 10^6	24.4	21.7				
Unit 5						
Water In, °F	315	318				
Water Out, °F	390	385				
Flow, 1000 lb/hr	305	300				
BTU/hr, 10^6	22.5	21.0				
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 3/15/ 1981

Sheet 1 of 1

Military Time	14:20					
Unit 8						
Water In, °F	275					
Water Out, °F	400					
Flow, gpm	395					
O_2	11					
BTU/hr, 10^6	51.0					
Unit 7						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F	315					
Water Out, °F	390					
Flow, 1000 lb/hr	300					
Btu/hr, 10^6	22.5					
Unit 5						
Water In, °F	315					
Water Out, °F	390					
Flow, 1000 lb/hr	260					
BTU/hr, 10^6	19.5					
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 3/16 1981

Sheet 1 of 1

from operators log sheet

Military Time	08:15	1205	1455	2210	3/17 0200 To next day	
Unit 8						AVG.
Water In, °F	270	270	280	280	~~280~~	
Water Out, °F	405	405	400	400	~~400~~	
Flow, ~~gpm~~ 1000 lb/hr	390	395	400	400	~~395~~	
O_2 %	8	8	11	10.5	~~11~~	
BTU/hr, 10^6	54.0	57.0	48.6	47	~~22.6~~ >	~~[illegible]~~ 51.6
Unit 7						
Water In, °F			315	300	~~320~~	
Water Out, °F			400	430	~~390~~	
Flow, 1000 lb/hr			250	300	~~295~~	
BTU/hr, 10^6			21.3	16.5	~~29.6~~	
				19.5 × 10/24	=	8.1
Unit 6						
Water In, °F	310	300	315	300	~~320~~	
Water Out, °F	400	390	400	410	~~390~~	
Flow, 1000 lb/hr	305	305	305	300	~~305~~	
Btu/hr, 10^6	27.4	27.5	25.9	18	~~24.5~~	24.7
Unit 5						
Water In, °F	310	305	320	320	~~320~~	
Water Out, °F	400	390	400	380	~~390~~	
Flow, 1000 lb/hr	265	265	265	300	~~280~~	
BTU/hr, 10^6	23.7	22.5	21.2	18	~~19.6~~	21.3
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S.S, DLE, MA

Date 3/17 1981

Sheet 1 of 1

		SS	SS	DLE	MA	3/18 MA	
Military Time	02:00	07:15	11:05	1905	2200	0210 To next day	AvG.
Unit 8							
Water In, °F	280	270	280	300	280	270	
Water Out, °F	400	395	405	415	405	395	
Flow, ~~gpm~~ 1000 lb/hr	395	395	395	395	400	385	
O_2 %	11	11	10.5	11.5	10.5	11	
BTU/hr, 10^6	22.6	50.4	50.4	48.0	47	25.6	43.7
Unit 7							
Water In, °F	320	305	315	320	320	315	
Water Out, °F	390	385	395	390	390	380	
Flow, 1000 lb/hr	295	305	305	200	300	298	
BTU/hr, 10^6	20.6	24.4	24.4	21.0	21	19.1	22.3
Unit 6							
Water In, °F	320	305	315	320	320	315	
Water Out, °F	390	385	395	390	390	380	
Flow, 1000 lb/hr	305	275	275	300	300	305	
Btu/hr, 10^6	24.5	22.0	22.0	21.0	21	19.8	22.1
Unit 5							
Water In, °F	320	310	320	325	320	315	
Water Out, °F	390	385	395	390	390	380	
Flow, 1000 lb/hr	280	280	265	300	300	280	
BTU/hr, 10^6	19.6	20.3	19.9	19.5	21	18.2	20.1
							108.2
Unit 4							
Water In, °F							
Water Out, °F							
Flow, 1000 lb/hr		~~280~~					
BTU/hr, 10^6							

PEDCo ENVIRO

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 3|18 1981

Sheet 1 of 1

Military Time	2:10	08:35	11:55	1630	2300		AVG.
Unit 8							
Water In, °F	270	285	290	310	290		
Water Out, °F	395	410	410	420	410		
Flow, ~~gpm~~ 1000 lb/hr	385	395	395	395	395		
O_2	11	10.5	11.5	11.5	11		
BTU/hr, 10^6	25.6	51.6	48.6	48.0	48.6		44.5
Unit 7							
Water In, °F	315	320	325	325	325		
Water Out, °F	380	395	400	395	405		
Flow, 1000 lb/hr	298	295	295	295	280		
BTU/hr, 10^6	19.1	22.1	22.1	20.7	23.6		21.5
Unit 6							
Water In, °F	315	320	325	325	325		
Water Out, °F	380	395	400	395	400		
Flow, 1000 lb/hr	305	305	305	305	300		
Btu/hr, 10^6	19.8	22.1	22.1	20.7	22.5		21.4
Unit 5							
Water In, °F	315	325	330	330	330		
Water Out, °F	380	395	400	395	410		
Flow, 1000 lb/hr	280	265	265	265	265		
BTU/hr, 10^6	18.2	18.6	18.6	17.2	21.2		18.8
							106.2
Unit 4							
Water In, °F							
Water Out, °F							
Flow, 1000 lb/hr							
BTU/hr, 10^6							

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 3/19 1981

Sheet 1 of 1

Military Time	7:35	12:20	17:10			AVG.
Unit 8						
Water In, °F	285	280	285			
Water Out, °F	405	405	415			
Flow, ~~gpm~~ 1000 lb/hr.	395	395	395			
0_2 %	11	11	10			
BTU/hr, 10^6	49.8	49.8	52.2			50.6
Unit 7						
Water In, °F	315	315	320			
Water Out, °F	405	400	395			
Flow, 1000 lb/hr	280	300	280			
BTU/hr, 10^6	25.2	25.5	21.0			23.9
Unit 6						
Water In, °F	315	315	320			
Water Out, °F	405	400	395			
Flow, 1000 lb/hr	305	305	305			
Btu/hr, 10^6	27.5	25.9	22.9			25.5
Unit 5						
Water In, °F	320	320	320			
Water Out, °F	405	400	395			
Flow, 1000 lb/hr	265	265	265			
BTU/hr, 10^6	22.5	21.2	19.9			21.2 121.2
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 3/20 1981

Sheet 1 of 1

Purple

Military Time	08:10	13:15	17:45	2330	0430 (3/21)	
Unit 8						
Water In, °F	280	285	285	285	315	
Water Out, °F	400	400	400	400	405	
Flow, ~~gpm~~ 1000 lb/hr	395	395	395	34 [illegible]	33	
O_2 %	11	12	12	[illegible] 4.6 10	4.5	
BTU/hr, 10^6	48.6	48	46.8			
Unit 7						
Water In, °F	310	320	320			
Water Out, °F	390	400	390	355	380	
Flow, 1000 lb/hr	~~280~~ 300	300	300			
BTU/hr, 10^6	24.0	24.0	21.0			
Unit 6						
Water In, °F	310	320	320			
Water Out, °F	390	400	390	385	380	
Flow, 1000 lb/hr	305	305	305			
Btu/hr, 10^6	24.4	24.4	21.4			
Unit 5						
Water In, °F	315	320	325			
Water Out, °F	390	400	390	385	380	
Flow, 1000 lb/hr	265	265	265			
BTU/hr, 10^6	19.9	21.2	17.2			
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 3/21 1981

Sheet 1 of 1

			03/22/81			
Military Time	11:00	1530	0130	0530		
Unit 8						
Water In, °F	~~[illegible]~~ 280	285	275	280		
Water Out, °F	405	410	410	410		
Flow, ~~gpm~~ 1000 lb/hr	395	36	34	34		
O_2 %	10.5	10.0	8.5	9.0		
BTU/hr, 10^6	51.6					
Unit 7						
Water In, °F	310					
Water Out, °F	395	385	390	39[illegible]		
Flow, 1000 lb/hr	300					
BTU/hr, 10^6	25.5					
Unit 6						
Water In, °F	310					
Water Out, °F	395	385	390	390		
Flow, 1000 lb/hr	300					
Btu/hr, 10^6	25.5					
Unit 5						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S Sabatini

Date 3/22 1981

Sheet 1 of 1

		3/23				
Military Time	0945	0100				
Unit 8						
Water In, °F	275	52				
Water Out, °F	400	82				
Flow, ~~gpm~~ 1000 lb/hr	395	32				
O_2 %	10	8.5				
BTU/hr, 10^6	52.2					
Unit 7						
Water In, °F	310					
Water Out, °F	385	330				
Flow, 1000 lb/hr	300					
BTU/hr, 10^6	22.5					
Unit 6						
Water In, °F	310					
Water Out, °F	385	330				
Flow, 1000 lb/hr	305					
Btu/hr, 10^6	22.9					
Unit 5						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 3/23 1981

Sheet 1 of 1

Military Time	0745	1350	1805	2350		AVG.
Unit 8						
Water In, °F	275	270	285	280		
Water Out, °F	410	400	400	400		
Flow, ~~gpm~~ 1000 lb/hr	395	395	405	405		
O_2 %	8.5	12.5	12	12.8		
BTU/hr, 10^6	54.6	46.2	48.0	45.0		48.5
Unit 7						
Water In, °F	305	325	320	320		
Water Out, °F	375	390	390	385		
Flow, 1000 lb/hr	300	300	300	300		
BTU/hr, 10^6	21.0	19.5	21.0	19.5		20.3
Unit 6						
Water In, °F	305	325	320	320		
Water Out, °F	375	390	390	385		
Flow, 1000 lb/hr	305	305	300	300		
Btu/hr, 10^6	21.4	19.8	21.0	19.5		20.4
						89.2
Unit 5						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 3/24 1981

Sheet 1 of 1

Military Time	0830	12:25	18:30	0023 03/25		
Unit 8						
Water In, °F	275	285	285	280 ~~[illegible]~~		
Water Out, °F	400	410	400	410		
Flow, ~~gpm~~ 1000lb/hr	395	390	390	390		
O_2 %	9	10	11	10.2		
BTU/hr, 10^6	54	52.2	48.0	51.0		
Unit 7						
Water In, °F	310	320	320	315		
Water Out, °F	385	400	385	390		
Flow, 1000 lb/hr	280	280	280	280		
BTU/hr, 10^6	21.0	22.4	18.2	21.0		
Unit 6						
Water In, °F	310	320	320	315		
Water Out, °F	385	400	385	390		
Flow, 1000 lb/hr	305	305	300	300		
Btu/hr, 10^6	22.9	24.4	19.5	22.5		
Unit 5						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S Sabetini

Date 3/25 1981

Sheet 1 of 1

Military Time	0820	12:50	18:15	0045 03/26		
Unit 8						
Water In, °F	280	290	290	280		
Water Out, °F	405	410	410	400		
Flow, ~~gpm~~ 1000 lb/hr	380	380	375	375		
O_2 %	11	11	12	12		
BTU/hr, 10^6	51.0	49.2	49.2	48.0		
Unit 7						
Water In, °F	315	325	325	315		
Water Out, °F	390	400	395	390		
Flow, 1000 lb/hr	280	280	280	280		
BTU/hr, 10^6	21.0	21.0	19.6	21.0		
Unit 6						
Water In, °F	315	325	325	315		
Water Out, °F	390	400	395	390		
Flow, 1000 lb/hr	305	305	305	305		
Btu/hr, 10^6	22.9	22.9	21.4	22.9		
Unit 5						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 3/26 1981

Sheet 1 of 1

Military Time	0825	1330	1650	0030		
Unit 8						
Water In, °F	285	285	285	290		
Water Out, °F	400	405	405	400		
Flow, ~~gpm~~ 1000 lb/m.	375	380	380	375		
O_2 %	12	12	11	13		
BTU/hr, 10^6	40.5	48.6	48.6	44.4		
Unit 7						
Water In, °F	315	325	325	320		
Water Out, °F	390	395	390	285		
Flow, 1000 lb/hr	280	300	300	300		
BTU/hr, 10^6	21.0	21.0	19.5	19.5		
Unit 6						
Water In, °F	315	325	325	320		
Water Out, °F	390	395	390	385		
Flow, 1000 lb/hr	305	305	305	305		
Btu/hr, 10^6	22.9	21.4	19.8	19.8		
Unit 5						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S Sabatini

Date 3/27 1981

Sheet 1 of 1

Military Time	0820	1405	1720			
Unit 8						
Water In, °F	275	285	285			
Water Out, °F	400	400	405			
Flow, ~~gpm~~ 1000lb/hr	380	380	380			
O_2 %	9	12	12			
BTU/hr, 10^6	52.2	48.0	48.6			
Unit 7						
Water In, °F	310	320	325			
Water Out, °F	380	385	390			
Flow, 1000 lb/hr	300	300	300			
BTU/hr, 10^6	21.0	19.5	19.5			
Unit 6						
Water In, °F	310	320	325			
Water Out, °F	380	385	390			
Flow, 1000 lb/hr	305	305	305			
Btu/hr, 10^6	21.4	19.8	19.8			
Unit 5						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 3/28 1981

Sheet 1 of 1

Military Time	14:10	1730	0230			
Unit 8						
Water In, °F	295	295	310			
Water Out, °F	410	400	410			
Flow, ~~gpm~~ 1000 lb/hr	385	380	380			
O_2 %	12	14	10.5			
BTU/hr, 10^6	46.8	41.4	48.0			
Unit 7						
Water In, °F	335	335	325			
Water Out, °F	400	395	390			
Flow, 1000 lb/hr	300	300	300			
BTU/hr, 10^6	19.5	18.0	19.5			
Unit 6						
Water In, °F	335	335	320			
Water Out, °F	400	395	390			
Flow, 1000 lb/hr	305	305	305			
Btu/hr, 10^6	19.8	18.3	21.4			
Unit 5						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S Sabatini

Date 3/29 1981

Sheet 1 of 1

Military Time	20:30	03/30 0150				
Unit 8						
Water In, °F	285	275				
Water Out, °F	405	410				
Flow, ~~gpm~~ 1000 lb/hr	380	375				
O_2 %	11	9				
BTU/hr, 10^6	50.4	56.0				
Unit 7	off line @ 0800					
Water In, °F						
Water Out, °F		~~390~~				
Flow, 1000 lb/hr		~~340~~				
BTU/hr, 10^6						
Unit 6						
Water In, °F	320	315				
Water Out, °F	395	390				
Flow, 1000 lb/hr	300	300				
Btu/hr, 10^6	22.5	22.5				
Unit 5						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 3/30 1981

Sheet 1 of 1

Military Time	0830	12:40	19:30			
Unit 8						
Water In, °F	280	275	285			
Water Out, °F	405	400	405			
Flow, ~~gpm~~ 1000 lb/hr	380	405	405			
O_2 %	11	10	11			
BTU/hr, 10^6	50.4	53.4	49.2			
Unit 7						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F	315	310	320			
Water Out, °F	385	380	395			
Flow, 1000 lb/hr	310	310	300			
Btu/hr, 10^6	21.7	21.7	22.5			
Unit 5						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 4/1 1981

Sheet 1 of 1

Military Time	1100					
Unit 8						
Water In, °F	280					
Water Out, °F	405					
Flow, ~~gpm~~ 1000 lb/hr	380					
O_2 %	10					
BTU/hr, 10^6	53.4					
Unit 7						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F	315					
Water Out, °F	390					
Flow, 1000 lb/hr	305					
Btu/hr, 10^6	229					
Unit 5						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S. Sebatini

Date 4/2 1981

Sheet 1 of 1

Military Time	0830	1250	1815	0045		
Unit 8						
Water In, °F	280	285	285	290		
Water Out, °F	405	405	405	410		
Flow, ~~gpm~~ 1000 lb/hr	370	370	370	370		
O_2 %	–	11	11	11.5		
BTU/hr, 10^6	52.2	49.8	49.8	50.4		
Unit 7						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F	310	320	320	325		
Water Out, °F	390	390	385	390		
Flow, 1000 lb/hr	305	305	305	305		
Btu/hr, 10^6	24.4	21.4	19.8	19.8		
Unit 5						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S. Sebetini

Date 4/3 1981

Sheet 1 of 1

Military Time	0815	1420	1740	0020		
Unit 8						
Water In, °F	285	290	290	275		
Water Out, °F	405	410	405	400		
Flow, ~~gpm~~ 1000 lb/hr	370	370	~~3~~375	380		
O_2 %	11	10.5	12	12		
BTU/hr, 10^6	49.8	51.0	48.0	45.6		
Unit 7						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F	320	325	320	315		
Water Out, °F	385	390	385	370		
Flow, 1000 lb/hr	305	305	305	300		
Btu/hr, 10^6	19.8	19.8	19.8	16.5		
Unit 5						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 4/4 1981

Sheet 1 of 1

Military Time	1445	2350				
Unit 8						
Water In, °F	290	275				
Water Out, °F	415	400				
Flow, ~~gpm~~ 1000 lb/hr	370	368				
O_2 %	11	9				
BTU/hr, 10^6	50.4	56.0				
Unit 7						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F	325	310				
Water Out, °F	400	390				
Flow, 1000 lb/hr	300	300				
Btu/hr, 10^6	22.5	24.0				
Unit 5						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 4/5 1981

Sheet 1 of 1

Military Time	1555					
Unit 8						
Water In, °F	280					
Water Out, °F	405					
Flow, ~~gpm~~ 1000 lb/hr	385					
O_2 %	11					
BTU/hr, 10^6	51.6					
Unit 7						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F	285					
Water Out, °F	385					
Flow, 1000 lb/hr	300					
Btu/hr, 10^6	30.0					
Unit 5						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 4/6 1981

Sheet 1 of 1

Military Time	0820	1350	17:15	2400		
Unit 8						
Water In, °F	275	275	277	275		
Water Out, °F	405	410	407	400		
Flow, ~~gpm~~ 1000 lb/hr.	370	370	370	400		
O_2 %	–	10	11.5	11.0		
BTU/hr, 10^6	55.8	55.2	52.2	51.0		
Unit 7						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F	320	325	325	320		
Water Out, °F	390	390	410	400		
Flow, 1000 lb/hr	300	300	315	300		
Btu/hr, 10^6	21.0	19.5	26.7	24.0		
Unit 5						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 4/7 1981

Sheet 1 of 1

Military Time	0920	1415	1830	2405		
Unit 8						
Water In, °F	275	275	280	280		
Water Out, °F	410	405	405	400		
Flow, ~~gpm~~ 1000 lb/hr	370	370	370	400		
O_2 %	10	11	11	12		
BTU/hr, 10^6	55.2	51.6	49.8	~~[illegible]~~ 48		
Unit 7						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F	325	305	330	320		
Water Out, °F	390	390	385	390		
Flow, 1000 lb/hr	288	288	300	300		
Btu/hr, 10^6	18.7	24.4	16.5	21		
Unit 5						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 4/8 1981

Sheet 1 of 1

Military Time	0815	1405	1800	2330		
Unit 8						
Water In, °F	270	280	280	285		
Water Out, °F	405	400	405	410		
Flow, ~~gpm~~ 1000 lb/hr	370	370	405	405		
O_2 %	9.5	11.5	11	11		
BTU/hr, 10^6	56.4	50.4	51.6	50.4		
Unit 7						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F	320	330	335	320		
Water Out, °F	390	385	395	390		
Flow, 1000 lb/hr	300	310	[illegible] 288	288		
Btu/hr, 10^6	21.0	17.1	17.3	20.2		
Unit 5						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S. Sabatini

Date 4/9 1981

Sheet 1 of 1

Military Time	0835	1200	1800			
Unit 8						
Water In, °F	285	285	290			
Water Out, °F	405	410	410			
Flow, ~~gpm~~ 1000 lb/hr	405	405	405			
O_2 %	11.5	11	12			
BTU/hr, 10^6	49.2	51.6	48.6			
Unit 7						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F	335	335	340			
Water Out, °F	375	390	400			
Flow, 1000 lb/hr	310	310	310			
Btu/hr, 10^6	18.6	17.1	18.6			
Unit 5						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

PN 3450-39

BOILER DATA

Recorded by S. Sebatini

Date 4/10 1981

Sheet 1 of 1

Military Time	0820	1300	1610			
Unit 8						
Water In, °F	280	290	290			
Water Out, °F	405	410	405			
Flow, ~~gpm~~ 1000 lb/hr	405	405	405			
O_2 %	11.5	12	13			
BTU/hr, 10^6	50.4	49.2	46.2			
Unit 7						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 6						
Water In, °F	325	340	345			
Water Out, °F	390	395	400			
Flow, 1000 lb/hr	365	305	305			
Btu/hr, 10^6	19.8	17.1	17.1			
Unit 5						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						
Unit 4						
Water In, °F						
Water Out, °F						
Flow, 1000 lb/hr						
BTU/hr, 10^6						

APPENDIX F

DAILY SCRUBBER OPERATING DATA FROM PANEL BOARD READINGS

PN 3450-39

SCRUBBER DATA

Recorded by S.S

Date 2-18 1981

Sheet 1 of 1

Military Time	14:30					
Gas flow, 1000scfm	50,000					
Temp, °F	340					
Pres., H_2O"						
Fan Amps	80					
Damper Opening,%	.37					
SO_2 IN, ppm	600					
OUT, ppm	23					
O_2 IN, %	/					
OUT, %	/					
Slurry Density	1.09					
Sludge to pond, hrs	443.9					
First stage tank,pH	4.9					
Limestone tank, pH	4.9					
LS pounds	960754					
LS % feed	2.3					
LS tons remaining	79.5					
Mist eliminator ΔP H_2O"						

PN 3450-39

SCRUBBER DATA

Recorded by G B & SS

Date 2-19 1981

Sheet 1 of 1

Military Time	7:45	11:05	14:45			
Gas flow, 1000scfm	38,000	37,000	29,000			
Temp, °F	340	270	270			
Pres., H_2O"						
Fan Amps	83	84	80			
Damper Opening,%	38	25	22			
SO_2 IN, ppm	550	500	250			
OUT, ppm		~15	20			
O_2 IN, %		16.7	16.0			
OUT, %		16.7	16.0			
Slurry Density	1.097	1.082	1.08			
Sludge to pond, hrs						
First stage tank,pH	4.8	4.8	4.9			
Limestone tank, pH	4.7	5.0	4.5			
LS pounds	-	971120	973000			
LS % feed	51	29	29			
LS tons remaining	102.1	97	96.2			
Mist eliminator ΔP H_2O"						
Inlet pressure ("H_2O)	29.5	30	29			

PN 3450-39

SCRUBBER DATA

Recorded by GB + SS

Date 2-20 1981

Sheet 1 of 1

Military Time	10:20	13:15	18:00			
Gas flow, 1000scfm	49	47	38			
Temp, °F	340	370	380			
Pres., H_2O"	29	28	29			
Fan Amps	82	88	79			
Damper Opening,%	30	30	30			
SO_2 IN, ppm	650	840				
OUT, ppm	120	177				
O_2 IN, %	13.7	14.4				
OUT, %	13.8	14.0				
Slurry Density	1.095	1.099	1.095			
Sludge to pond, hrs	0.4	0.55	2.1			
First stage tank,pH	4.7	4.5	4.5			
Limestone tank, pH	4.8	4.9	4.2			
LS pounds	983235	985053	988404			
LS % feed	28	27	50			
LS tons remaining	96	91	92			
Mist eliminator ΔP H_2O"		1.7	1.7			

PN 3450-39

SCRUBBER DATA

Recorded by PAC

Date 2 - 21+22 1981

Sheet 1 of 1

Military Time	2/21 15:00		2/22 14:45			
Gas flow, 1000scfm	37		47			
Temp, °F	400		360			
Pres., H_2O"	29		29.5			
Fan Amps	80		81			
Damper Opening,%	36		37			
SO_2 IN, ppm						
OUT, ppm						
O_2 IN, %	15.6		15.8			
OUT, %	16.4		15.5			
Slurry Density	1.090		1.082			
Sludge to pond, hrs	8.35		13.2			
First stage tank,pH	5.0		4.7			
Limestone tank, pH	4.2		4.1			
LS pounds	7737		20144			
LS % feed	.50		.30			
LS tons remaining	80.5		76			
Mist eliminator ΔP H_2O"	1.8		1.8			

PN 3450-39

SCRUBBER DATA

Recorded by S.S.

Date 2-23 1981

Sheet 1 of 1

Military Time	9:15	13.10	16:15	17:50		
Gas flow, 1000scfm	62	57	60	67		
Temp, °F	370	410	465	470		
Pres., H_2O"	28.5	28	29	28		
Fan Amps	81	77	75	76		
Damper Opening,%	36	40	67	64		
SO_2 IN, ppm	720		980	900		
OUT, ppm	105		165	108		
O_2 IN, %	14		14	21?		
OUT, %	14					
Slurry Density	1.089	1.078	1.09	1.095		
Sludge to pond, hrs	15.8	16.8	17.1	17.8		
First stage tank,pH	4.4	4.5	4.6	4.4		
Limestone tank, pH	4.2	4.2	4.0	4.0		
LS pounds	28890	31134	32901	34032		
LS % feed	29	26	35	34		
LS tons remaining	77.8	76.1	75.4	70.7		
Mist eliminator ΔP H_2O"	1.7	1.7	-	1.7		

PN 3450-39

SCRUBBER DATA

Recorded by Steve Sabatini

Date 2/24 1981

Sheet 1 of 2

Military Time	8:40	10:15	12:50	17:48		
Gas flow, 1000scfm	70+	70+	70+	70+		
Temp, °F	445	450	440	450		
Pres., H_2O"	28	28	28	28.5		
Fan Amps	79	79	80	78		
Damper Opening,%	63.5	67%	63.5	64		
SO_2 IN, ppm	1020	900	750	780		
OUT, ppm	6	195	135	96		
O_2 IN, %	20	14.2	16	18.5		
OUT, %	20	—	16	18.5		
Slurry Density	1.096	1.092	1.091	1.095		
Sludge to pond, hrs	21.6	22.1	22.5	23.4		
First stage tank,pH	4.4	4.6	4.4	4.3		
Limestone tank, pH	probe out	→	probe out	5.4		
LS pounds	43338	44237	45856	48762	= 602 lb/h	
LS % feed	26	35	25	~~37~~ 40/34		
LS tons remaining	84	83.5	83.3	81.9		
Mist eliminator ΔP H_2O"	1.7	—	1.7	1.7		
	S.S.	G.B.				

PN 3450-39

SCRUBBER DATA

Recorded by Steve. Sabatini

Date 2/25/ 1981

Sheet 1 of 1

Military Time	8:20	13.45	17:12			
Gas flow, 1000scfm	70+	69	65			
Temp, °F	420	430	425			
Pres., H_2O"	29	29	29			
Fan Amps	78	78	78			
Damper Opening,%	66	68	68			
SO_2 IN, ppm	960	900	972			
OUT, ppm	138	120	53			
O_2 IN, %	17.8	18.4	18.4			
OUT, %	17.8	18.4	18.4			
Slurry Density	1.095	1.099	1.091			
Sludge to pond, hrs	26.8	27.9	29.4			
First stage tank,pH	4.3	4.3	4.4			
Limestone tank, pH	3.7	4.5	4.3			
LS pounds	57954	61908	64785			
LS % feed	31/37	42	44			
LS tons remaining	78.5	76.5	75.1			
Mist eliminator ΔP H_2O"	1.8	1.8	1.7			

PN 3450-39

SCRUBBER DATA

Recorded by Sabatini

Date 2/26 1981

Sheet 1 of 1

Military Time	06:50	11:13	13:48	16:13		
Gas flow, 1000scfm	70+	70+	70+	70+		
Temp, °F	470	455	460	480		
Pres., H_2O"	28	29	28.5	29		
Fan Amps	81	78	80	76		
Damper Opening,%	63	63.5	63.5	64		
SO_2 IN, ppm	900	889	–	–		
OUT, ppm	12	37 10:36	–	–		
O_2 IN, %	–	19.5	–	–		
OUT, %	–	19.5	–	–		
Slurry Density	1.098	1.095	1.097	1081		
Sludge to pond, hrs	33.9	34.9	35.5	35.7		
First stage tank,pH	4.5	4.6	4.5	4.4		
Limestone tank, pH	5.0	5.1	4.8	4.6		
LS pounds	75652	78780	80468	82050		
LS % feed	43	35	35/36	25/35		
LS tons remaining	70.2	88.6	87.0	86.3		
Mist eliminator ΔP H_2O"	1.9	1.7	1.8	1.7		

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 2/27 1981

Sheet 1 of 1

Military Time	00:40	07:35	10:15	14:20	17:35		
Gas flow, 1000scfm		70+	70+	63	63		
Temp, °F		495	480	460	470		
Pres., H_2O"		29	30	30.5	30.5		
Fan Amps		86	79	78	75		
Damper Opening,%		63.5	76	80	85.3		
SO_2 IN, ppm	745	/	775	908	824		
OUT, ppm	44	/	69	69	55		
O_2 IN, %	19.3	/	17	15.3	17.6		
OUT, %	19.3	/	17	15.2	19.8		
Slurry Density		1.091	1.087	1.087	1.095		
Sludge to pond, hrs		39.6	40.3	41.4	42.2		
First stage tank,pH		4.1	4.2	4.2	4.3		
Limestone tank, pH		4.1	4.2	4.2	4.9		
LS pounds		91970	93926	97202	99881 ~~79.2~~		
LS % feed		39	44	44	44/37		
LS tons remaining		82.3	81.6	80.9	79.2		
Mist eliminator ΔP H_2O"		1.7	1.8	1.7	1.8		

Feeder off

PN 3450-39

SCRUBBER DATA

Recorded by Sabatini

Date 2/28/ 1981

Sheet 1 of 1

Military Time		07:55	11:00				
Gas flow, 1000scfm		66	65				
Temp, °F		430	420				
Pres., H_2O"		30.5	30.5				
Fan Amps		88					
Damper Opening,%		85					
SO_2 IN, ppm		701	–				
OUT, ppm	18:20	74	–				
O_2 IN, %		18.2	–				
OUT, %		20.7	–				
Slurry Density		1.047	1.065				
Sludge to pond, hrs		47.4	47.4				
First stage tank,pH		4.5	4.5				
Limestone tank, pH	4.7 in lab	4.2	4.4				
LS pounds		109690	111934				
LS % feed		37	40				
LS tons remaining		75.1	74.6				
Mist eliminator ΔP H_2O"		1.6	1.7				

at 4:30 A.M.
operator
noticed
plugging
problems
in dissolving
tank.

PN 3450-39

SCRUBBER DATA

Recorded by Sabatini

Date 3/1 1981

Sheet 1 of 1

Military Time	0826	16:50				
Gas flow, 1000scfm	70+	70+				
Temp, °F	435	420				
Pres., H_2O"	30.5	31				
Fan Amps	79	80				
Damper Opening,%	85	86				
SO_2 IN, ppm	6665	7362 14:53				
OUT, ppm	12	26				
O_2 IN, %	20.9	20.9				
OUT, %	20.9	20.9				
Slurry Density	1.098	~~1.098~~ 1.102				
Sludge to pond, hrs	51.9	539				
First stage tank,pH	4.5 ~~[illegible]~~	4.5				
Limestone tank, pH	4.9 in lab 4.7	5.0				
LS pounds	126485	132510				
LS % feed	36/38	40				
LS tons remaining	66.5	64.9				
Mist eliminator ΔP H_2O"	1.7	1.7				

PN 3450-39

SCRUBBER DATA

Recorded by Sabatini

Date 3/2 1981

Sheet 1 of 1

Military Time	0:800	12:20	16:00	18:15		
Gas flow, 1000scfm	70+	70+	70	70+		
Temp, °F	450	450	360	380		
Pres., H_2O"	30.5	31	30.5	30		
Fan Amps	79	77	82	82		
Damper Opening,%	83	84	40	40		
SO_2 IN, ppm	—	426?	711	765 ~~380~~?		
OUT, ppm	—	13?	47	49 ~~28~~		
O_2 IN, %	—	20?	14.3	14.0		
OUT, %	—	20?	14.9	14.3		
Slurry Density	1.099	1.091	1.091	1.095		
Sludge to pond, hrs	58.0	59.2	61.0	61.5		
First stage tank,pH	4.5	4.5	4.4	4.5		
Limestone tank, pH	5.1	5.0	5.0	5.2		
LS pounds	143550	146768	149309	150919		
LS % feed	38	39	39	39		
LS tons remaining	59.5	78.9	77.5	77.1		
Mist eliminator ΔP H_2O"	1.7	1.7	1.8	—		

PN 3450-39

SCRUBBER DATA

Recorded by S.Sabatini

Date 3/3 1981

Sheet 1 of 1

Military Time	07:45	9:30	15:05	17:05		
Gas flow, 1000scfm	70+	70+	64	64		
Temp, °F	370	360	375	380		
Pres., H_2O"	30.5	30.5	31	30.5		
Fan Amps	84	84	84	84		
Damper Opening,%	36	36	37	37		
SO_2 IN, ppm	691	804	620	–		
OUT, ppm	29	74	33	–		
O_2 IN, %	15.2	–	16.5	–		
OUT, %	15.6	15.4	–	/		
Slurry Density	1.099	1.098	1.088	1.098		
Sludge to pond, hrs	65.1	65.5	67.3	67.3		
First stage tank,pH	4.6	4.6	4.6	4.6		
Limestone tank, pH	5.2	5.2	5.1	9.1		
LS pounds	160578	161860	166250	167812		
LS % feed	38	40	42	41		
LS tons remaining	72.7	72.0	69.5	69.0		
Mist eliminator ΔP H_2O"	1.9	-	–	1.7		

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 3/4 1981

Sheet 1 of 1

Military Time	07:50	10:05	13:15	16:10		
Gas flow, 1000scfm	70+	70+	70+	70+		
Temp, °F	360	385	380	380		
Pres., H_2O"	30.5	30.5	30.5	30.5		
Fan Amps	83	84	82	81		
Damper Opening,%	36	36	37	37		
SO_2 IN, ppm	662	672	662	657		
OUT, ppm	27	49	30	29		
O_2 IN, %	15.0	14.5	14.2	14.7		
OUT, %	15.3	13.9	14.0	14.3		
Slurry Density	1.095	1.090	1.100	1.098		
Sludge to pond, hrs	72.2	73.0	73.7	74.7		
First stage tank,pH	4.7	4.7	4.7	4.7		
Limestone tank, pH	5.0	5.0	5.0	5.0		
LS pounds	179057	180700	183122	185535		
LS % feed	40	40	40	44		
LS tons remaining	64.2	80	79.2	78.7		
Mist eliminator ΔP H_2O"	1.8	—	—	1.8		
	adding limestone to silo		↑ +1 bag AA			

PN 3450-39

SCRUBBER DATA

Recorded by Sabatini

Date 3/5/81 1981

Sheet 1 of 1

Military Time	07:20	14:15	18:50			
Gas flow, 1000scfm	70+	70+	70+			
Temp, °F	350	410	410			
Pres., H_2O"	30	31	31			
Fan Amps	84	79	82			
Damper Opening,%	36	71	76			
SO_2 IN, ppm	593	510?	–			
OUT, ppm	33	55	43			
O_2 IN, %	14.0	15.3	14.2			
OUT, %	13.9	12.5	13.2			
Slurry Density	1.097	1.095	1.095			
Sludge to pond, hrs	79.7	81.5	83.0			
First stage tank,pH	4.8	4.7	4.4			
Limestone tank, pH	5.0	5.0	5.0			
LS pounds	198516	203993	207584	= 788 lb/h		
LS % feed	46	41	42			
LS tons remaining	73.1	87.7	85.7			
Mist eliminator ΔP H_2O"	1.7	1.6	1.7			

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 3/6 1981

Sheet 1 of 1

Military Time		07:35	14:15	17:00			
Gas flow, 1000scfm		70+	70+	70+			
Temp, °F		410	435	440			
Pres., H_2O"		30.5	30.5	30.5			
Fan Amps		80	80	80			
Damper Opening,%		60	72	72			
SO_2 IN, ppm		716	552	780			
OUT, ppm	7:08 A.M.	43	62	46			
O_2 IN, %		15.0	14.4	15.6			
OUT, %		14.0	14.8	14.9			
Slurry Density		1.091	1.110	1.110			
Sludge to pond, hrs		87.3	88.7	89.8			
First stage tank,pH		4.8	4.6	4.7			
Limestone tank, pH		5.0	5.0	5.0			
LS pounds		217508	222719	225025			
LS % feed		40	44	45			
LS tons remaining		80.9	78.9	77.5			
Mist eliminator ΔP H_2O"		1.7	1.7	1.7			

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 3/7/81 ~~1981~~

Sheet 1 of 1

Military Time	13:40	17:15				
Gas flow, 1000scfm	70+	70+				
Temp, °F	460	460				
Pres., H_2O"	30.5	30				
Fan Amps	77	74				
Damper Opening,%	72	72				
SO_2 IN, ppm	932	917				
OUT, ppm	82	40				
O_2 IN, %	15.0	15.0				
OUT, %	14.6	15.0				
Slurry Density	1.087	1.097				
Sludge to pond, hrs	97.0	98.2				
First stage tank,pH	4.7	4.6				
Limestone tank, pH	5.1	5.1				
LS pounds	242406	245557				
LS % feed	46	47				
LS tons remaining	68.7	69.0				
Mist eliminator ΔP H_2O"	1.7	1.7				

feeder OK
16.7 lb/hr.

PN 3450-39

SCRUBBER DATA

Recorded by Sabatini

Date 3/8 1981

Sheet 1 of 1

Military Time	14:45	16:40				
Gas flow, 1000scfm	68	66				
Temp, °F	430	430				
Pres., H_2O"	31	31				
Fan Amps	80	80				
Damper Opening,%	72	72				
SO_2 IN, ppm	858	804				
OUT, ppm	81	51				
O_2 IN, %	16.1	17.2				
OUT, %	15.1	16.2				
Slurry Density	1.098	1.091				
Sludge to pond, hrs	105.7	106.4				
First stage tank,pH	4.8	4.8				
Limestone tank, pH	5.2	5.1				
LS pounds	264170	265556				
LS % feed	45	45				
LS tons remaining	59.5	59.1				
Mist eliminator ΔP H_2O"	1.7	1.7				

Feed Rate = 16.7 lb/hr

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 3/9 1981

Sheet 1 of 1

Military Time	08:15	01:00	14:30	17:00		
Gas flow, 1000scfm	70+	65	64	70		
Temp, °F	350	440	430	430		
Pres., H_2O"	35.5	30.5	30.5	30.5		
Fan Amps	87	77	78	80		
Damper Opening,%	66	68	70	70		
SO_2 IN, ppm	519	736	850	750 ~~1000~~		
OUT, ppm	14	44	70	25 [illegible]		
O_2 IN, %	18.3	15.7	–	–		
OUT, %	17.6	14.7	–	–		
Slurry Density	1.095	1.089	1.099	1.091		
Sludge to pond, hrs	112.2	112.5	113.3	114.0		
First stage tank,pH	4.8	4.8	4.8	4.8		
Limestone tank, pH	5.2	5.2	5.0	5.0		
LS pounds	278961	281232	283989	285883		
LS % feed	45	41	41	41		
LS tons remaining	53.7	52.7	50.3	49.3		
Mist eliminator ΔP H_2O"	2.2	1.7	1.7	1.7		

feeder @ 16.7 lb/m.

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 3/10 1981

Sheet 1 of 1

Military Time	08:25	11:15	14:30	18:15		
Gas flow, 1000scfm	70+	70	70+	70+		
Temp, °F	450	430	420	420		
Pres., H_2O"	30	30.5	31	31		
Fan Amps	76	77	77	78		
Damper Opening,%	70	72	72	72		
SO_2 IN, ppm	-	850	775	726		
OUT, ppm	-	65	55	32		
O_2 IN, %	-	14	13.7	13.7		
OUT, %	-	14	13.9	13.7		
Slurry Density	1.095	1.101 ~~1.099~~	1.099	1.095		
Sludge to pond, hrs	118.9	119.5	120.6	121.9		
First stage tank,pH	4.8	4.8	4.8	4.8		
Limestone tank, pH	5.0	5.0	5.2	5.0		
LS pounds	298037	300189	302647	305454		
LS % feed	42.5	40	41	40		
LS tons remaining	42.8	41.8	46.2	40.1		
Mist eliminator ΔP H_2O"	1.8	1.8	1.8	1.8		

feeder
@16.7 lb/m

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 3/11 1981

Sheet 1 of 1

Military Time	10:35	13:50	17:45			
Gas flow, 1000scfm	70	68	70+			
Temp, °F	375	380	375			
Pres., H_2O"	30	30	30			
Fan Amps	79	79	80			
Damper Opening,%	35	36	36			
SO_2 IN, ppm 8:40 A.M.	736	733	724			
OUT, ppm	37	39	41			
O_2 IN, %	—	15.7	15.4			
OUT, %	—	15.4	15.1			
Slurry Density	1.091	1.101	1.092			
Sludge to pond, hrs	126.6	127.2	128.6			
First stage tank,pH	4.8	4.8	4.8			
Limestone tank, pH	5.0	5.0	5.0			
LS pounds	317679	320142	323305			
LS % feed	39	40/42	42			
LS tons remaining	35.3	34.0	53.0			
Mist eliminator ΔP H_2O"	1.7	1.7	1.7			

feeder @
16.7
lb/m.

PN 3450-39

SCRUBBER DATA

Recorded by s. Sabatini

Date 3/12 1981

Sheet 1 of 1

Military Time	08:15	10:55	13:40	18:35		
Gas flow, 1000scfm	70+	68	62	65		
Temp, °F	330	390	375	355		
Pres., H_2O"	30.5	30	30.5	30		
Fan Amps	81	79	79	79		
Damper Opening,%	38	36	36	36		
SO_2 IN, ppm	628	781	643	600		
OUT, ppm	20	59	32	20		
O_2 IN, %	15.4	14.1	15.3	—		
OUT, %	15.0	14.2	15.2	—		
Slurry Density	1.099	1.095	1.095	1.095		
Sludge to pond, hrs	133.2	133.3	133.9	135.3		
First stage tank,pH	4.8	4.7	4.8	4.8		
Limestone tank, pH	5.0	5.0	5.0	5.0		
LS pounds	334769	336939	338941	342798		
LS % feed	42	39/41	42	42		
LS tons remaining	47.9	46.6	~	82.9		
Mist eliminator ΔP H_2O"	1.8	1.8	1.7	1.8		

feeder
@ 16.7
lb/m.

PN 3450-39

SCRUBBER DATA

Recorded by S Salatini

Date 3/13 1981

Sheet 1 of 1

Military Time	08:15	13:55	17:05			
Gas flow, 1000scfm	69	59	65			
Temp, °F	310	355	360			
Pres., H_2O"	30.5	30	30			
Fan Amps	79	78	77			
Damper Opening,%	36	36	36			
SO_2 IN, ppm	800	800	–			
OUT, ppm	30	50	–			
O_2 IN, %	–	–	–			
OUT, %	–	–	–			
Slurry Density	1.091	1.099	1.095			
Sludge to pond, hrs	139.8	140.7	141.8			
First stage tank,pH	4.8	4.8	4.8			
Limestone tank, pH	4.8	4.8	4.8			
LS pounds	353184	357557	359757			
LS % feed	40	40	40			
LS tons remaining	60.1	–	75.1			
Mist eliminator ΔP H_2O"	1.7	1.7	1.7			

feeder @
~16.7 lb/hr

PN 3450-39

SCRUBBER DATA

Recorded by D. Etson

Date March 14 1981

Sheet 1 of 1

Military Time	10:30	1500				
Gas flow, 1000scfm	+70	45				
Temp, °F	368	385				
Pres., H_2O"	30	30.5				
Fan Amps	82	81				
Damper Opening,%	35	36				
SO_2 IN, ppm	875	—				
OUT, ppm	25	—				
O_2 IN, %	—	—				
OUT, %	—	—				
Slurry Density	1.091	1.093				
Sludge to pond, hrs	147.3	148.8				
First stage tank,pH	4.6	4.7				
Limestone tank, pH	4.6	4.6				
LS pounds	372293	375580				
LS % feed	38	39				
LS tons remaining	69.0	67.6				
Mist eliminator ΔP H_2O"	1.7					

feed @
16.7 lb/hr

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 3/15/81

Sheet 1 of 1

Military Time	14:20					
Gas flow, 1000scfm	65					
Temp, °F	350					
Pres., H_2O"	31					
Fan Amps	79					
Damper Opening,%	40					
SO_2 IN, ppm	771					
OUT, ppm	77					
O_2 IN, %	14.6					
OUT, %	15.3					
Slurry Density	1.095					
Sludge to pond, hrs	155.4					
First stage tank,pH	4.8					
Limestone tank, pH	4.6					
LS pounds	392713					
LS % feed	41					
LS tons remaining	59.1					
Mist eliminator ΔP H_2O"	1.8					

feeder
set@ 16.7
lb/hr.

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini
Date 3/16 1981
Sheet 1 of 1

Military Time	08:15	12:05	14:55	2155	3/17 0200	
Gas flow, 1000scfm	70+	70+	62	70+	70+	
Temp, °F	370	370	460	470	480	
Pres., H_2O"	30.5	30.5	29	29.5	29	
Fan Amps	85	84	78	77	76	
Damper Opening,%	40	40	50	67	68	
SO_2 IN, ppm	676	890	852	981	1014	
OUT, ppm	71	93	73	146	202	
O_2 IN, %	15.0	14.2	13.9	14.2	14.0	
OUT, %	15.5	14.2	14.4	14.2	13.8	
Slurry Density	1.091	1.095	1.095	48 1.091	1.099	
Sludge to pond, hrs	161.2	162.0	162.8	~~15.6~~ 164.3	165.3	
First stage tank,pH	4.8	4.8	4.6	4.5	4.4	
Limestone tank, pH	4.4	4.4	4.4	4.2	4.2	
LS pounds	405731	408765	411053	415155	417208	
LS % feed	37/42	42	43/42	26	27	
LS tons remaining	–	74.7	68.7	~67	~65	
Mist eliminator ΔP H_2O"	2.0	2.0	1.8	1.8	1.7	
				MA.	M.A.	

feeder
@ 167
lb/hr.

PN 3450-39

SCRUBBER DATA

Recorded by SS, DLE, MA

Date 3/17 1981

Sheet 1 of 1

	SS	SS	DLE	MA	3/18 MA	
Military Time	07:15	11:04	1905	2150	0200	
Gas flow, 1000scfm	70+	65	69	70+	70+	
Temp, °F	470	440	470	470	480	
Pres., H_2O"	29	29	28.5	29	28.5	
Fan Amps	78	77	78	80	78	
Damper Opening,%	66	68	67	67	68	
SO_2 IN, ppm	876	928	814	781	781	
OUT, ppm	189	180	138	132	166	
O_2 IN, %	14.7	14.1	15.2	14.9	14.7	
OUT, %	14.2	14.1	15.2	15.1	14.6	
Slurry Density	1.099	1.089	1.090	1.097	1.091	
Sludge to pond, hrs	166.8	168.0	170	170.9	172.3	
First stage tank,pH	4.4	4.2	4.3	4.3	4.2	
Limestone tank, pH	4.4	4.2	4.0	4.2	4.4	
LS pounds	419733	421552	425509	426857	428929	
LS % feed	25	25	28	27.5	27	
LS tons remaining	69.0	—	62.2	~68	60.5	
Mist eliminator ΔP H_2O"	2.0	1.7	1.9	1.9	1.8	

feeder @ 16.7 lb/hr.

PN 3450-39

SCRUBBER DATA

Recorded by SSabatini

Date 3/18 1981

Sheet 1 of 1

Military Time	08:35	11:55	1630	2300		
Gas flow, 1000scfm	70+	60	60	70+		
Temp, °F	440	460	450	445		
Pres., H_2O"	29	29	29	29		
Fan Amps	78	78	77	79		
Damper Opening,%	67	68	68	67		
SO_2 IN, ppm	838	890	950	862		
OUT, ppm	240	266	145	186		
O_2 IN, %	14.4	16.4	21.5	15.7		
OUT, %	14.9	16.5	21.5	15.6		
Slurry Density	1.099	1.095	1.091	1.091		
Sludge to pond, hrs	173.7	174.2	175.6	177.5		
First stage tank,pH	4.0	4.0	4.1	4.2		
Limestone tank, pH	4.1	4.2	4.6	4.4		
LS pounds	432167	433791	436328	440352		
LS % feed	27	27	35	33		
LS tons remaining	59.1	—	74.8	73		
Mist eliminator ΔP H_2O"	1.9	1.6	1.4	1.8		

feeder
@
16.7
16/hr.

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 3/19 1981

Sheet 1 of 1

Military Time	07:35	12:20	17:10			
Gas flow, 1000scfm	70+	70+	70+			
Temp, °F	460	460	440			
Pres., H_2O"	28.5	28.5	29			
Fan Amps	78	78	79			
Damper Opening,%	66	67	68			
SO_2 IN, ppm	1062	1047	881			
OUT, ppm	290	213	102			
O_2 IN, %	13.3	13.6	14.6			
OUT, %	13.6	14.5	14.7			
Slurry Density	1.087	1.076	1.080			
Sludge to pond, hrs	180.3	181.1	182.4			
First stage tank,pH	4.0	4.0	4.2			
Limestone tank, pH	4.2	4.5	4.7			
LS pounds	445493	448564	453141			
LS % feed	32/35	35	45			
LS tons remaining	70.7	←	68.0			
Mist eliminator ΔP H_2O"	2.3	2.3	2.1			

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 3/20 1981

Sheet 1 of 1

→03/21/81

Military Time	8:10	13:15	17:45	2330	0430	
Gas flow, 1000scfm	70+	70+	64	66	66	
Temp, °F	460	380	470	449	452	
Pres., H_2O"	29.5	31	29.5	30.5	—	
Fan Amps	77	84	80	79	79	
Damper Opening,%	66	67	68	81.5	81.5	
SO_2 IN, ppm	776	666	985	824	885	
OUT, ppm	75	72	91	61	72	
O_2 IN, %	15.2	16.3	14.0	15.0	14.4	
OUT, %	14.7	15.7	14.0	14.7	14.3	
Slurry Density	1.090	1.099	1.095	1.000	1.092	
Sludge to pond, hrs	187.4	189.0	190.3	192.8	194.7	
First stage tank,pH	4.5	4.6	4.6	4.7	4.8	
Limestone tank, pH	5.0	5.0	4.8	5 Dissolver 2.2	5.2	
LS pounds	464728	469020	473034	478739	483314	
LS % feed	45	45/50 [illegible]	50	54	54	
LS tons remaining	60.2	—	81.2	74.0	72.3	
Mist eliminator ΔP H_2O"	1.9	2.5	1.8	—	—	

feeders set@ 16.7 lb/hr 11.4

PN 3450-39

SCRUBBER DATA

Recorded by S. Sapatini

Date 3/21 1981

Sheet 1 of 1

Military Time	1100	1645	0120	0530		
Gas flow, 1000scfm	60	59	66	69		
Temp, °F	360	365	429	425		
Pres., H_2O"	31	30	29	29		
Fan Amps	82	82	82	82		
Damper Opening,%	40	40	32	32		
SO_2 IN, ppm	833	681	771	771		
OUT, ppm	73	36	56	58		
O_2 IN, %	15.5	16.7	15.4	15.4		
OUT, %	14.8	16.7	15.4	15.4		
Slurry Density	1.049	1.093	1.098	1,000		
Sludge to pond, hrs	197.3	199.3	202.6	203.9		
First stage tank,pH	4.8	4.9	5.0	5.0		
Limestone tank, pH	5.2	5.2	5.2	5.1		
LS pounds	488867	494397	500849	504583		
LS % feed	45	45	45	45		
LS tons remaining	69.3	72	65.7	64.0		
Mist eliminator ΔP H_2O"	2.5	—	—	—		

PN 3450-39

SCRUBBER DATA

Recorded by S Sabatini

Date 3/22 1981

Sheet 1 of 1

		23				
Military Time	0945	0045				
Gas flow, 1000scfm	62	57				
Temp, °F	400	400				
Pres., H_2O"	29.5	27.0				
Fan Amps	79	79				
Damper Opening,%	32	30				
SO_2 IN, ppm	666	747				
OUT, ppm	55	238				
O_2 IN, %	15.9	14.9				
OUT, %	15.7	15.4				
Slurry Density	1.095	1,095				
Sludge to pond, hrs	206.0	208.7				
First stage tank,pH	5.0	5.0				
Limestone tank, pH	5.2	4.3				
LS pounds	508477	517100				
LS % feed	52/45	30				
LS tons remaining	60.8	55.2				
Mist eliminator ΔP H_2O"	2.9	—				

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 3/23 1981

Sheet 1 of 1

Military Time	0745	1350	18:05	2350		
Gas flow, 1000scfm	58	35	35	40		
Temp, °F	380	360	355	365		
Pres., H_2O"	29.5	30	29.5	29.0		
Fan Amps	80	82	84	82		
Damper Opening,%	30	41	40	35		
SO_2 IN, ppm	538		624	—		
OUT, ppm	88		84	—		
O_2 IN, %	15.7		16.7	—		
OUT, %	15.7		16.5	—		
Slurry Density	1.091	1.091	1.095	1.091		
Sludge to pond, hrs	210.8	212.5	213.2	214.8		
First stage tank,pH	4.9	4.7	4.6	4.5		
Limestone tank, pH	4.9	4.6	4.4	4.4		
LS pounds	520875	523329	525437	—		
LS % feed	30	32/25	25	—		
LS tons remaining	53.2	49.9	—	5.0		
Mist eliminator ΔP H_2O"	2.5	2.9	2.1	—		

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 3/24 1981

Sheet 1 of 1

Military Time	0830	12:05	1830	2355		
Gas flow, 1000scfm	49	48	37	50		
Temp, °F	335	350	350	385		
Pres., H_2O	30	29	29.5	29.5		
Fan Amps	83	82	79	82		
Damper Opening,%	34	34	35	35		
SO_2 IN, ppm	776	775	628	714		
OUT, ppm	139	112	73	119		
O_2 IN, %	15.9	15.5	17.0	15.8		
OUT, %	16.0	15.5	16.8	16.2		
Slurry Density	1.095	1.093	1.091	1.091		
Sludge to pond, hrs	216.6	217.0	218.7	220.4		
First stage tank,pH	4.4	4.4	4.6	4.5		
Limestone tank, pH	4.4	4.4	4.8	4.2		
LS pounds	532078	534002	537442	540649		
LS % feed	25	30	28	25/33		
LS tons remaining	69.0	–	66.8	64		
Mist eliminator ΔP H_2O"	2.6	2.1	3.0	2.2		

↑ Coupon not scaling

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 3/25 1981

Sheet 1 of 1

				03/26		
Military Time	0820	1250	1815	0030		
Gas flow, 1000scfm	50	49	57	62		
Temp, °F	340	340	320	330		
Pres., H_2O"	30	32	33	32		
Fan Amps	81	89	90	89		
Damper Opening,%	34	64	63	63		
SO_2 IN, ppm	771	652	571			
OUT, ppm	79	65	50			
O_2 IN, %	15.2	16.7	16.8			
OUT, %	15.3	16.5	16.7			
Slurry Density	1.091	1.093	1.095	1.095		
Sludge to pond, hrs	223.1	224.2	225.7	227.8		
First stage tank,pH	4.7	4.8	4.8	4.8		
Limestone tank, pH	4.9	4.8	5.0	5.1		
LS pounds	545958	548976	552621	556728		
LS % feed	37/35	37	35	35		
LS tons remaining	62.9	—	77.8	75.8		
Mist eliminator ΔP H_2O"	2.5	2.9	2.2	3.2		

pH blip to 5.1@ 11:50 in dissolver tank.

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 3/26 1981

Sheet 1 of 1

Military Time	0825	13:30	16:50	0030		
Gas flow, 1000scfm	57	51	49	62		
Temp, °F	360	320	320	340		
Pres., H_2O"	30	32	33	32		
Fan Amps	81	85	84	85		
Damper Opening,%	32	60	60	60		
SO_2 IN, ppm	614	647	619	—		
OUT, ppm	plugged probe?.	45	57	—		
O_2 IN, %	15.9	16.0	16.4	—		
OUT, %	18.0	16.3	16.5	—		
Slurry Density	1.081	1.091	1.101	1.095		
Sludge to pond, hrs	231.3	232.6	233.2	236.9		
First stage tank,pH	4.9	4.9	5.0	5.0		
Limestone tank, pH	5.0	4.9	5.0	5.5		
LS pounds	561911	565283	567624	57239		
LS % feed	34/33	37	35	35		
LS tons remaining	73.8	—	85.0	84		
Mist eliminator ΔP H_2O"	2.7	2.2	2.2	—		

PN 3450-39

SCRUBBER DATA

Recorded by S. Sebatini

Date 3/27 1981

Sheet 1 of 1

Military Time	0820	~~13:50~~ 14:05	17:20			
Gas flow, 1000scfm	49	62	53			
Temp, °F	320	330	370			
Pres., H_2O"	30	33	30			
Fan Amps	82	86	81			
Damper Opening,%	30	58	40			
SO_2 IN, ppm	709	619	652			
OUT, ppm	74	56	61			
O_2 IN, %	15.9	17.4	16.6			
OUT, %	15.8	17.8	16.6			
Slurry Density	1.085	1.100	1.091			
Sludge to pond, hrs	238.5	240.0	241.5			
First stage tank,pH	4.9	4.8	4.8			
Limestone tank, pH	5.0	5.0	5.0			
LS pounds	576142	579263	581551			
LS % feed	31/37	30/35	36			
LS tons remaining	82.6	—	79.5			
Mist eliminator ΔP H_2O"	2.1	2.0	1.8			

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 3/28 1981

Sheet 1 of 1

Military Time	1410	17:30	0230			
Gas flow, 1000scfm	52	52	60			
Temp, °F	370	350	330			
Pres., H_2O"	31	30.5	31.0			
Fan Amps	80	82	83			
Damper Opening,%	40	41	42			
SO_2 IN, ppm	606	500	556			
OUT, ppm	56	48	94			
O_2 IN, %	16.2	17.2	17.0			
OUT, %	16.2	17.3	17.2			
Slurry Density	1.095	1.103	1.087			
Sludge to pond, hrs	247.3	247.7	250.1			
First stage tank,pH	4.8	4.9	4.9			
Limestone tank, pH	5.2	5.2	5.0			
LS pounds	594305	596216	601021			
LS % feed	30	30	28			
LS tons remaining	97.6	—	89.4			
Mist eliminator ΔP H_2O"	1.6	1.7	—			

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 3/29 1981

Sheet 1 of 1

Military Time	20:30	0130				
Gas flow, 1000scfm	48	55				
Temp, °F	270	280				
Pres., H_2O"	29.5	30				
Fan Amps	81	81				
Damper Opening,%	24	25				
SO_2 IN, ppm	638	586				
OUT, ppm	55	49.0				
O_2 IN, %	16.5	17.0				
OUT, %	16.3	16.8				
Slurry Density	1.076	1.059				
Sludge to pond, hrs	251.5	252.0				
First stage tank,pH	4.8	4.8				
Limestone tank, pH	5.0	5.2				
LS pounds	609689	611686				
LS % feed	30	30				
LS tons remaining	85.3	84				
Mist eliminator ΔP H_2O"	—	—				

PN 3450-39

SCRUBBER DATA

Recorded by S. Salvatini

Date 3/30 1981

Sheet 1 of 1

Military Time	0835	1240	19:35			
Gas flow, 1000scfm	61	61	67			
Temp, °F	245	250	255			
Pres., H_2O"	32.5	32	30			
Fan Amps	92	89	91			
Damper Opening,%	44	34	34			
SO_2 IN, ppm	475	467	509			
OUT, ppm	43	32	164			
O_2 IN, %	—	18.0	18.4			
OUT, %	—	18.0	18.4			
Slurry Density	1.062	1.070	1.009			
Sludge to pond, hrs	252.7	252.7	252.7			
First stage tank,pH	4.8	4.8	4.6			
Limestone tank, pH	5.1	5.2	3.9			
LS pounds	615423	617512	620615			
LS % feed	29	42	0			
LS tons remaining	84.6	—	81.3			
Mist eliminator ΔP H_2O"	1.7	2.0	—			

Thickener Plugged.

↑ Adipic Acid feeder off 19:40

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 4/1 1981

Sheet 1 of 1

Military Time	1100					
Gas flow, 1000scfm	60					
Temp, °F	250					
Pres., H_2O"	30					
Fan Amps	90					
Damper Opening,%	28					
SO_2 IN, ppm	–					
OUT, ppm	–					
O_2 IN, %	–					
OUT, %	–					
Slurry Density	1.062					
Sludge to pond, hrs	252.8					
First stage tank,pH	5.2					
Limestone tank, pH	5.8					
LS pounds	629466					
LS % feed	30					
LS tons remaining	–					
Mist eliminator ΔP H_2O"	1.9					

pH of limestone tank = 5.73 with portable pH meter.

Scrubber not @ normal operating conditions

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 4/2 1981

Sheet 1 of 1

Military Time	0830	1250	1815	4/3 0030		
Gas flow, 1000scfm	61	50	50	56		
Temp, °F	210	270	250	260		
Pres., H_2O"	32	30.5	30.5	30.5		
Fan Amps	90	90	87	88		
Damper Opening,%	29	29	30	30		
SO_2 IN, ppm	552	433	400	395		
OUT, ppm	53	25	30	32		
O_2 IN, %	17.3	17.7	18.1	18.4		
OUT, %	17.0	17.4	17.8	18.0		
Slurry Density	1.091	1.095	1.081	1.090		
Sludge to pond, hrs	257.7	257.7	258.7	259.6		
First stage tank,pH	5.2	5.2	5.3	5.2		
Limestone tank, pH	5.6	5.6	5.5	5.2		
LS pounds	640388	642500	644790	647502		
LS % feed	27	22	24	23		
LS tons remaining	—	—	89.1	88.1		
Mist eliminator ΔP H_2O"	1.7	1.7	1.7	1.6		

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 4/3 1981

Sheet 1 of 1

				04/04		
Military Time	0815	1420	1740	0010		
Gas flow, 1000scfm	58	50	51	48		
Temp, °F	250	240	265	230		
Pres., H_2O"	30	30	30	30		
Fan Amps	86	84	86	86		
Damper Opening,%	30	30	30	20		
SO_2 IN, ppm	433	476	428	290		
OUT, ppm	37	24	10	0		
O_2 IN, %	17.9	17.2	18.3	19.5		
OUT, %	17.9	17.1	18.3	19.2		
Slurry Density	1.099	1.089	1.089	1.085		
Sludge to pond, hrs	260.2	260.8	261.5	263		
First stage tank,pH	5.0	5.0	5.0	5.1		
Limestone tank, pH	4.8	4.6	5.0	5.3		
LS pounds	650795	653331	654940	657949		
LS % feed	23/25	27	27	26		
LS tons remaining	87.4	–	86.0	89		
Mist eliminator ΔP H_2O"	1.9	1.9	1.8	1.8		

0754

↑

New Valve installed

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 4/7 1981

Sheet 1 of 1

Military Time	1445	2345				
Gas flow, 1000scfm	37	38				
Temp, °F	260	260				
Pres., H_2O"	29.5	30				
Fan Amps	86	86				
Damper Opening,%	27	28				
SO_2 IN, ppm	514	533				
OUT, ppm	35	18				
O_2 IN, %	16.6	17.3				
OUT, %	17.1	17.6				
Slurry Density	1.099	1.095				
Sludge to pond, hrs	264.6	266.3				
First stage tank,pH	4.9	4.9				
Limestone tank, pH	4.6	4.8				
LS pounds	664859	668462				
LS % feed	25/28	25				
LS tons remaining	82.3	81.2				
Mist eliminator ΔP H_2O"	1.5	—				

PN 3450-39

SCRUBBER DATA

Recorded by S. Salatini

Date 4/5 1981

Sheet 1 of 1

Military Time	1555					
Gas flow, 1000scfm	28					
Temp, °F	280					
Pres., H_2O"	27.5					
Fan Amps	81					
Damper Opening,%	20					
SO_2 IN, ppm	695					
OUT, ppm	44					
O_2 IN, %	16.8					
OUT, %	17.0					
Slurry Density	1.095					
Sludge to pond, hrs	268.5					
First stage tank,pH	4.7					
Limestone tank, pH	4.6					
LS pounds	677421					
LS % feed	32					
LS tons remaining	77.8					
Mist eliminator ΔP H_2O"	1.2					

PEDCo ENVIRO

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 4/6 1981

Sheet 1 of 1

Military Time	0820	13:50	17:05	2350		
Gas flow, 1000scfm	43	47	48	25		
Temp, °F	260	270	275	290		
Pres., H_2O"	28	30	30	30		
Fan Amps	85	86	87	88		
Damper Opening,%	20	26	26	26		
SO_2 IN, ppm	724	581	—	495		
OUT, ppm	57	17	—	10		
O_2 IN, %	15.9	16.6	—	17.4		
OUT, %	16.3	16.9	—	17.4		
Slurry Density	1.091	1.091	1.091	1.091		
Sludge to pond, hrs	273.0	274.4	274.9	276.7		
First stage tank,pH	4.6	4.8	4.9	5.0		
Limestone tank, pH	4.4	5.2	5.4	5.4		
LS pounds	686849	690448	692653	696669		
LS % feed	31/35	35	36/32	32		
LS tons remaining	72.7	—	74.1	88.0		
Mist eliminator ΔP H_2O"	1.5	1.5	1.7	—		

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 4/7 1981

Sheet 1 of 1

Military Time	0920	1400	1830	2355		
Gas flow, 1000scfm	48	50	47	52		
Temp, °F	230	255	260	260		
Pres., H_2O"	30.5	30.5	30.	29		
Fan Amps	88	88	88	88		
Damper Opening,%	26	28	28	28		
SO_2 IN, ppm	614	528	433	428		
OUT, ppm	23	4	5	56		
O_2 IN, %	18.7	16.9	18.0	18.0		
OUT, %	19.5	17.0	17.8	18.2		
Slurry Density	1.089	1.076	1.038	1.034		
Sludge to pond, hrs	278.6	278.6	278.9	278.9		
First stage tank,pH	5.0	5.0	5.0	4.8		
Limestone tank, pH	5.2	5.3	5.2	4.0		
LS pounds	702047	704717	707100	708583		
LS % feed	31/30	32	10	0		
LS tons remaining	86.3	85.7	84.6	87.4		
Mist eliminator ΔP H_2O"	1.6	2.0	1.8	—		

↑ thickener plugged

↑ operator told me to leave feed rate @ 0%

PN 3450-39

SCRUBBER DATA

Recorded by S. Salatini

Date 4/8/81

Sheet 1 of 1

Military Time	0815	1405	1800	2325		
Gas flow, 1000scfm	48	48	48	48		
Temp, °F	220	235	250	250		
Pres., H_2O"	32	31.5	30.5	30.5		
Fan Amps	88	89	87	88		
Damper Opening,%	30	32	34	34		
SO_2 IN, ppm	650	481	486	528		
OUT, ppm	5	5	10	20		
O_2 IN, %	–	17.6	17.6	17.6		
OUT, %	–	17.7	17.6	17.6		
Slurry Density	1.076	1.097	1.091	1.099		
Sludge to pond, hrs	278.9	279.4	279.8	280.5		
First stage tank,pH	4.8	4.8	4.8	4.8		
Limestone tank, pH	5.0	5.2	4.7	4.4		
LS pounds	712518	715922	717252	719286		
LS % feed	25	23	15	25		
LS tons remaining	81.9	—	—	95.9		
Mist eliminator ΔP H_2O"	1.9	2.0	1.7	—		

off strip chart.

↑ limestone was @40% for a while to increase density

PN 3450-39

SCRUBBER DATA

Recorded by S. Sebatini

Date 4/9 1981

Sheet 1 of 1

Military Time	0835	1200	18:00			
Gas flow, 1000scfm	49	55	37			
Temp, °F	250	245	255			
Pres., H_2O"	30.5	30.5	30.5			
Fan Amps	90	90	90			
Damper Opening,%	34	34	32			
SO_2 IN, ppm	467	514	486			
OUT, ppm	24	40	17			
O_2 IN, %	16.4	17.8	17.9			
OUT, %	18.0	17.8	17.6			
Slurry Density	1.099	1.095	1.099			
Sludge to pond, hrs	281.8	282.5	283.1			
First stage tank,pH	4.7	4.7	4.8			
Limestone tank, pH	4.4	4.4	4.8			
LS pounds	723425	724890	727539			
LS % feed	24	24	26			
LS tons remaining	94.8	—	93.8			
Mist eliminator ΔP H_2O"	1.9	2.0	2.0			

PN 3450-39

SCRUBBER DATA

Recorded by S. Sabatini

Date 4/10 1981

Sheet 1 of 1

Military Time	0820	13:00	1610			
Gas flow, 1000scfm	37	46	37			
Temp, °F	250	245	245			
Pres., H_2O"	30.5	31	31			
Fan Amps	91	89	86			
Damper Opening,%	32	32	32			
SO_2 IN, ppm	462	452	500			
OUT, ppm	23	13	22			
O_2 IN, %	18.1	18.0	16.9			
OUT, %	18.1	18.2	17.2			
Slurry Density	1.092	1.097	1.091			
Sludge to pond, hrs	286.3	286.8	287.3			
First stage tank,pH	4.8	4.8	4.8			
Limestone tank, pH	4.8	5.0	4.8			
LS pounds	733976	736198	737812			
LS % feed	23/26	27	27			
LS tons remaining	—	108.8	106.4			
Mist eliminator ΔP H_2O"	1.9	1.9	—			